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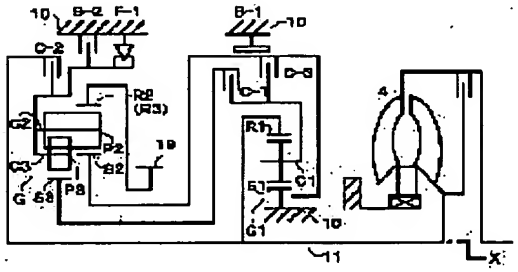
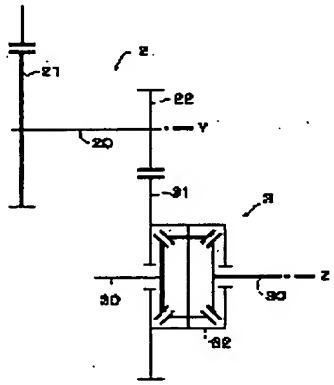
(54) AUTOMATIC TRANSMISSION

(57)Abstract:

PROBLEM TO BE SOLVED: To reduce weight and to miniaturize a mechanism against a speed- change stage number by shortening a high torque transmission route in a multi- stage automatic transmission.

SOLUTION: The automatic transmission is provided with a planetary gear set G for outputting a plurality of speed-change rotations making a speed- reduction rotation and a non-speed-reduction rotation as an input; a speed- reduction planetary gear G1; an input shaft 11; first and third clutches C-1, C-3 for attachably/detachably connecting the input shaft 11 to two different speed-reduction input elements S2, S3 through the speed-reduction planetary gear G1 respectively; and a second clutch C-2 for attachably/detachably connecting the input shaft 11 to a nonspeed-reduction rotation input element C2 (C3) of the planetary gear set G. The first and third clutches C-1, C-3 are together disposed and the second clutch C-2 is disposed at an opposite side of the planetary gear set G to the speed-reduction planetary gear G1.





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CLAIMS

[Claim(s)]
[Claim 1] The planetary-gear set which outputs two or more gear change rotations by considering moderation rotation and non-slowing down rotation as an input, The moderation planetary gear put in order and arranged by a planetary-gear set and shaft orientations, The input shaft which passes along the inner circumference side of a planetary-gear set, and the 1st and 3rd clutches which connect an input shaft with two different moderation input elements of a planetary-gear set respectively free [engaging and releasing] through moderation planetary gear, In an automatic transmission equipped with the 2nd clutch which connects an input shaft with the non-slowing down rotation input element of a planetary-gear set free [engaging and releasing] the 1st clutch and 3rd clutch Moderation planetary gear are automatic transmissions with which it is collectively arranged near the moderation planetary gear, and the 2nd clutch is characterized by having been arranged in the opposite side to a planetary-gear set.
[Claim 2] At the tip of the boss section which said each clutch consists of a friction member and a hydraulic servo, respectively, and is prolonged in shaft orientations from the wall of a change gear case Moderation planetary gear fix the one element, and are arranged, and the hydraulic servo of the 3rd clutch is arranged at the periphery of said boss section between a wall and moderation planetary gear. The automatic transmission according to claim 1 with which the hydraulic servo of the 1st clutch has been arranged with the hydraulic servo of the 3rd clutch to moderation planetary gear at the periphery of the input shaft of the opposite side.
[Claim 3] Said each clutch is an automatic transmission according to claim 1 with which it consisted of a friction member and a hydraulic servo, respectively, and moderation planetary gear fixed the one element, and have been arranged at the tip of the boss section prolonged in shaft orientations from the wall of a change gear case, and the hydraulic servo of the 3rd clutch has been arranged by the hydraulic servo of the 1st clutch, and wall approach on the periphery of said boss section between a wall and moderation planetary gear at moderation planetary-gear approach.
[Claim 4] At the tip of the boss section which said each clutch consists of a friction member and a hydraulic servo, respectively, and is prolonged in shaft orientations from the wall of a change gear case Moderation planetary gear fix the one element, and are arranged, and the hydraulic servo of the 1st clutch is arranged at the periphery of said boss section between a wall and moderation planetary gear. Moderation planetary gear are adjoined and another wall is established. The hydraulic servo of the 3rd clutch this -- the automatic transmission according to claim 1 which it has been arranged between another wall and moderation planetary gear, and the 1st clutch and 3rd clutch let between walls different from the boss section pass, and was connected with the planetary-gear set.
[Claim 5] The friction member of said 3rd clutch and the friction member of the 1st clutch are an automatic transmission according to claim 2, 3, or 4 arranged on one direction outside of a path of the hydraulic servo of the 1st clutch, the hydraulic servo of the 3rd clutch, and moderation planetary gear.
[Claim 6] It is the automatic transmission according to claim 5 with which the friction member of said 3rd clutch has been arranged on the direction outside of a path of moderation planetary gear, and the friction member of the 1st clutch has been arranged on the direction outside of a path of the hydraulic servo of the 1st clutch.
[Claim 7] It is the automatic transmission according to claim 2 with which the periphery side engaged with the own drum, and, as for the friction member of the 1st clutch, the inner circumference side was connected with the output element of moderation planetary gear by said 1st clutch's having the drum united with the hydraulic servo, and connecting this drum with the moderation rotation input element of a planetary-gear set towards the sense in which the cylinder of a hydraulic servo carries out opening to a moderation planetary-

gear side.
[Claim 8] Said 3rd clutch has the drum united with the hydraulic servo. This drum It connects with the moderation rotation input element of a planetary-gear set towards the sense in which the cylinder of a hydraulic servo carries out opening to a moderation planetary-gear side. The friction member of the 3rd clutch The automatic transmission according to claim 7 with which the periphery side engaged with the own drum, and was connected with the output element of moderation planetary gear through the hub where an inner circumference side is as common as the friction member of the 1st clutch.
[Claim 9] It is the automatic transmission according to claim 8 with which the brake consisted of band brakes which make the peripheral face of the drum of the 3rd clutch the engagement side of a brake band by preparing the brake which stops the moderation rotation input element of said planetary-gear set in a change gear case.
[Claim 10] It is the automatic transmission according to claim 2 with which this drum was connected with the output element of moderation planetary gear towards the sense to which the cylinder of a hydraulic servo carries out opening of the moderation planetary gear to the opposite side by said 1st clutch having the drum united with the hydraulic servo.
[Claim 11] It is the automatic transmission according to claim 5 with which the friction member of said 1st clutch has been arranged on the direction outside of a path of moderation planetary gear, and the friction member of the 3rd clutch has been arranged on the direction outside of a path of the hydraulic servo of the 1st clutch.
[Claim 12] It is the automatic transmission according to claim 5 with which the periphery side engaged with the own drum, and, as for the friction member of the 1st clutch, the inner circumference side was connected with the moderation rotation input element of a planetary-gear set by said 1st clutch's having the drum united with the hydraulic servo, and connecting this drum with the output element of moderation planetary gear towards the sense in which the cylinder of a hydraulic servo carries out opening to a moderation planetary-gear side.
[Claim 13] Said 3rd clutch has the drum united with the hydraulic servo. This drum It turns for the cylinder of a hydraulic servo carrying out opening, turning to the hydraulic-servo side of the 1st clutch, and being alike, and connects with the moderation rotation input element of a planetary-gear set. The friction member of the 3rd clutch The automatic transmission according to claim 12 with which the periphery side engaged with the own drum, and the inner circumference side was connected with the drum of the 1st clutch.
[Claim 14] It is the automatic transmission according to claim 13 with which the brake consisted of band brakes which make the peripheral face of the drum of the 3rd clutch the engagement side of a brake band by preparing the brake which stops the moderation rotation input element of said planetary-gear set in a change gear case.
[Claim 15] It is the automatic transmission according to claim 3 with which said moderation planetary gear and planetary-gear set have been adjacently arranged, the friction member of the 1st clutch has been arranged on the direction outside of a path of moderation planetary gear, and the friction member of the 3rd clutch has been arranged on the direction outside of a path of a planetary-gear set.
[Claim 16] The automatic transmission according to claim 12 with which the drum of the 1st clutch was made for the cylinder which the cylinder of the hydraulic servo of the 3rd clutch was formed behind the cylinder of the hydraulic servo which made the drum of said 1st clutch unify, and was formed back to engage with rotation impossible, and the piston of the hydraulic servo of the 3rd clutch was fitted in.
[Claim 17] The friction member of said 3rd clutch is the automatic transmission according to claim 16 whose engaging and releasing the periphery side used the piston of the hydraulic servo of the 3rd clutch as the drum, engaged with this drum, the inner circumference side was connected with the moderation rotation input element of a planetary-gear set, and was enabled by the push length to the drum of the 1st clutch.
[Claim 18] The friction member of the 3rd clutch is the automatic transmission according to claim 12 connected with the drum on which the periphery side engaged with the drum of the 3rd clutch, and the inner circumference side was united with the hydraulic servo of the 1st clutch by connecting the drum of said 3rd clutch with the moderation rotation input element of a planetary-gear set towards the sense in which the cylinder of the hydraulic servo united with it carries out opening to a moderation planetary-gear side.
[Claim 19] The drum of said 3rd clutch is the automatic transmission according to claim 18 with which rotation support was carried out through the hydraulic servo united with it by the boss section prolonged from said another wall, and the brake which consisted of band brakes that the moderation rotation input element of a planetary-gear set should be stopped in a change gear case was arranged considering the peripheral face of the drum of the 3rd clutch as an engagement side of a brake band.

[Claim 20] The automatic transmission according to claim 1 which the counter driven gear which gears with the counter drive gear which was made to connect with the output element of said planetary-gear set, and was prepared in the periphery of an input shaft, and a counter drive gear is formed, and has an input shaft, the counter shaft arranged in juxtaposition, and differential equipment by which is arranged in juxtaposition at a counter shaft and a rotation drive is carried out with a counter shaft.
[Claim 21] Said counter drive gear is an automatic transmission according to claim 20 arranged between the 1st clutch, the 3rd clutch and **** planetary gear, and a planetary-gear set.
[Claim 22] Said counter drive gear is an automatic transmission according to claim 20 arranged between the 2nd clutch and a planetary-gear set.
[Claim 23] For the 2nd clutch, said counter drive gear is an automatic transmission according to claim 20 arranged in the opposite side to a planetary-gear set.
[Claim 24] It is the automatic transmission according to claim 21, 22, or 23 with which said 1st clutch, the 3rd clutch, and moderation planetary gear have been arranged at the connection side with the engine of a change gear, and the 2nd clutch has been arranged at the back end side of a change gear.
[Claim 25] It is the automatic transmission according to claim 21, 22, or 23 with which said 2nd clutch has been arranged at the connection side with the engine of a change gear, and the 1st clutch, 3rd clutch, and moderation planetary gear have been arranged at the back end side of a change gear.
[Claim 26] Said each clutch is an automatic transmission according to claim 24 or 25 which had the hydraulic servo, respectively, arranged in order of the hydraulic servo of the hydraulic servo of the 1st clutch, moderation planetary gear, and the 3rd clutch, and has been arranged to a planetary-gear set.
[Claim 27] Said each clutch is an automatic transmission according to claim 24 or 25 which had the hydraulic servo, respectively, arranged in order of the hydraulic servo of moderation planetary gear and the 1st clutch, and the hydraulic servo of the 3rd clutch, and has been arranged to a planetary-gear set.
[Claim 28] Said each clutch is an automatic transmission according to claim 24 or 25 which had the hydraulic servo, respectively, arranged in order of the hydraulic servo of the hydraulic servo of the 3rd clutch, moderation planetary gear, and the 1st clutch, and has been arranged to a planetary-gear set.
[Claim 29] It is the automatic transmission according to claim 1 with which it was made to connect with the output element of said planetary GISESETTO, the output shaft was established, and the output shaft has been arranged in same axle with said input shaft.
[Claim 30] It is the automatic transmission according to claim 29 with which said 1st clutch, the 3rd clutch, and moderation planetary gear have been arranged at the connection side with the engine of a change gear, the 2nd clutch has been arranged at the back end side of a change gear, and the output element of a planetary-gear set was connected with the output shaft through the periphery of the 2nd clutch.
[Claim 31] Said each clutch is an automatic transmission according to claim 30 which had the hydraulic servo, respectively, arranged in order of the hydraulic servo of the hydraulic servo of the 1st clutch, moderation planetary gear, and the 3rd clutch, and has been arranged to a planetary-gear set.
[Claim 32] Said each clutch is an automatic transmission according to claim 30 which had the hydraulic servo, respectively, arranged in order of the hydraulic servo of moderation planetary gear and the 1st clutch, and the hydraulic servo of the 3rd clutch, and has been arranged to a planetary-gear set.
[Claim 33] Said each clutch is an automatic transmission according to claim 30 which had the hydraulic servo, respectively, arranged in order of the hydraulic servo of the hydraulic servo of the 3rd clutch, moderation planetary gear, and the 1st clutch, and has been arranged to a planetary-gear set.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention relates to arrangement of each change gear component in the gear train especially about the automatic transmission carried in a car.
[0002]
[Description of the Prior Art] An automatic transmission consists of a planetary-gear set, and a brake, the engagement element, i.e., the clutch, which changes the transfer path of the power through it. An automatic transmission has the request of multistage-izing from before for an improvement of improvement in drivability, and fuel consumption, and what attains the gear ratio of the advance 5th speed and the go-astern 1st speed is put in practical use recently. In the automatic transmission of such a 5th speed configuration, if the number of engagement elements needs to carry out engagement / release (the so-called hold substitute) control of the three or more engagement elements at coincidence at the time of the shift up down of increase and specific gear change interstage, things to control will become complicated, Dislike that a gear train is enlarged and one of 3 sets of the planetary gear is made into a double pinion type. A 5th speed configuration is realized in three clutches and two brakes, and the gear train which lost the hold substitute of three or more engagement elements is looked at by the technique of the indication to JP,4-125345,A.
[0003] Although few engagement elements have attained multistage with the above-mentioned conventional technique by inputting into the predetermined element of planetary gear the moderation rotation which slowed down the input rotation obtained by double pinion planetary gear from one clutch, there are the following troubles. Namely, although it is necessary it not only to make it multistage, but to make large gear ratio width of face as the whole change gear style for improvement in a fuel consumption improvement and drivability If the above-mentioned conventional technique is seen from such a viewpoint, since the 1st speed would input input rotation into the predetermined element with the clutch and other elements will be attained by fixing by the brake It is difficult for obtaining big moderation rotation to have difficult composition, consequently to make gear ratio width of face large. As what solves such a technical problem, the gear train which attains advance 6 ** and the go-astern 1st speed is proposed in JP,4-219553,A in three clutches and two brakes. This gear train is inputting into two gear change elements of a RABINIYO-type planetary-gear set the rotation slowed down to input rotation, and inputting non-slowing down rotation into other one gear change element, and enables achievement of multistage 6 **. With this conventional technique, since moderation rotation was inputted into the predetermined element with the clutch and other elements are attained by fixing by the brake in order to attain the 1st speed, comparatively big moderation rotation can be obtained and the multistage automatic gear change which made gear ratio width of face large can be attained.
[0004]
[Problem(s) to be Solved by the Invention] With the gear train configuration in the latter conventional technique, gear ratio width of face is wide, and while 6 ** of a good gear ratio step are obtained, if two power transfer paths of requiring high intensity-ization are needed and this transfer path is not constituted in a compact in order to transmit the high torque amplified by moderation by moderation planetary gear, enlargement of a change gear and the increase of weight will be caused. About this point, the clutch for non-slowing down torque transmission is arranged between moderation planetary gear, two clutches for moderation torque transmission, and planetary-gear sets, and, as for the latter technique, the consideration according to rank about high torque transmission is not made.
[0005] This invention is made in view of such a situation, is shortening the high torque-transmission path over a planetary-gear set, and aims at offering a light weight and the miniaturized multistage automatic

transmission for a gear train to the number of speeds attained.
[0006] Moreover, the drum and hub as the friction member from which the clutch as an engagement element constitutes a power transfer path, and its I/O connection member, As opposed to a thing with the degree of freedom of an arrangement location consist of hydraulic servos for engagement / release control, and large [a friction member] Since a hydraulic servo needs the hydraulic pressure supply to that, it makes it indispensable to support directly or indirectly in **** in which oilway connection is possible, or an automatic-transmission case, and receives constraint in an arrangement location. Only carrying out intensive arrangement of two moderation rotation input clutches and moderation planetary gear by the debt by the fixed approach of the reaction force element of moderation planetary gear causes enlargement of the device by leading about of a rather complicated member, and it results from such relation in spoiling the compactability of the gear train which lessened the number of engagement elements with much trouble.
[0007] Then, this invention sets it as the more concrete purpose to offer the gear train arrangement which prevents enlargement of the device accompanying intensive arrangement of moderation planetary gear and two moderation input clutches. Furthermore, this invention sets it as each still more concrete purpose to solve the various troubles which follow such gear train arrangement on applying to the automatic transmission of various concrete formats.
[0008]
[Means for Solving the Problem] The planetary-gear set which this invention considers moderation rotation and non-slowing down rotation as an input, and outputs two or more gear change rotations in order to attain the above-mentioned purpose, The moderation planetary gear put in order and arranged by a planetary-gear set and shaft orientations, The input shaft which passes along the inner circumference side of a planetary-gear set, and the 1st and 3rd clutches which connect an input shaft with two different moderation input elements of a planetary-gear set respectively free [engaging and releasing] through moderation planetary gear, In an automatic transmission equipped with the 2nd clutch which connects an input shaft with the non-slowing down rotation input element of a planetary-gear set free [engaging and releasing] the 1st clutch and 3rd clutch It is characterized by having been collectively arranged near the moderation planetary gear and having arranged the 2nd clutch with moderation planetary gear to a planetary-gear set in the opposite side.
[0009] In the above-mentioned configuration, said each clutch consists of a friction member and a hydraulic servo, respectively. From the wall of a change gear case, at the tip of the boss section prolonged in shaft orientations, moderation planetary gear fix the one element, and are arranged. It is effective that the hydraulic servo of the 3rd clutch is arranged at the periphery of said boss section between a wall and moderation planetary gear, and the hydraulic servo of the 3rd clutch considers as the configuration by which the hydraulic servo of the 1st clutch has been arranged at the periphery of the input shaft of the opposite side to moderation planetary gear.
[0010] Moreover, it consists of a friction member and a hydraulic servo, respectively, and at the tip of the boss section prolonged in shaft orientations from the wall of a change gear case, moderation planetary gear fix the one element, and are arranged, and said each clutch can also be taken on the periphery of said boss section between a wall and moderation planetary gear with the configuration by which the hydraulic servo of the 3rd clutch has been arranged at the hydraulic servo of the 1st clutch, and wall approach at moderation planetary-gear approach.
[0011] Moreover, said each clutch consists of a friction member and a hydraulic servo, respectively. From the wall of a change gear case, at the tip of the boss section prolonged in shaft orientations, moderation planetary gear fix the one element, and are arranged. The hydraulic servo of the 1st clutch is arranged at the periphery of said boss section between a wall and moderation planetary gear, moderation planetary gear are adjoined and another wall is established. The hydraulic servo of the 3rd clutch this -- it is arranged between another wall and moderation planetary gear, and the 1st clutch and 3rd clutch are good also as a configuration which let between walls different from the boss section pass, and was connected with the planetary-gear set.
[0012] Next, as for the friction member of said 3rd clutch, and the friction member of the 1st clutch, it is effective to take the configuration arranged on one direction outside of a path of the hydraulic servo of the 1st clutch, the hydraulic servo of the 3rd clutch, and moderation planetary gear.
[0013] Moreover, the friction member of said 3rd clutch is arranged on the direction outside of a path of moderation planetary gear, and the friction member of the 1st clutch can also be considered as the configuration arranged on the direction outside of a path of the hydraulic servo of the 1st clutch.
[0014] Furthermore, said 1st clutch has the drum united with the hydraulic servo, this drum is connected

with the moderation rotation input element of a planetary-gear set towards the sense in which the cylinder of a hydraulic servo carries out opening to a moderation planetary-gear side, the periphery side can engage with an own drum, and an inner circumference side can also consider the friction member of the 1st clutch as the configuration connected with the output element of moderation planetary gear.
[0015] Said 3rd clutch has the drum united with the hydraulic servo. Moreover, this drum It connects with the moderation rotation input element of a planetary-gear set towards the sense in which the cylinder of a hydraulic servo carries out opening to a moderation planetary-gear side. The friction member of the 3rd clutch The periphery side engages with an own drum, and an inner circumference side is good also as a configuration which connected with the output element of moderation planetary gear through the friction member of the 1st clutch, and the common hub.
[0016] And the brake which stops the moderation rotation input element of said planetary-gear set in a change gear case is prepared, and, as for a brake, it is effective to constitute from a band brake which makes the peripheral face of the drum of the 3rd clutch the engagement side of a brake band.
[0017] Moreover, said 1st clutch has the drum united with the hydraulic servo, and, as for this drum, it is effective to consider as the configuration by which the cylinder of a hydraulic servo was connected with the output element of moderation planetary gear towards the sense which carries out opening to moderation planetary gear in the opposite side.
[0018] Moreover, the friction member of said 1st clutch is arranged on the direction outside of a path of moderation planetary gear, and the friction member of the 3rd clutch can also take the configuration arranged on the direction outside of a path of the hydraulic servo of the 1st clutch.
[0019] Furthermore, said 1st clutch has the drum united with the hydraulic servo, this drum is connected with the output element of moderation planetary gear towards the sense in which the cylinder of a hydraulic servo carries out opening to a moderation planetary-gear side, and, as for the friction member of the 1st clutch, it is effective to consider as the configuration by which the periphery side engaged with the own drum, and the inner circumference side was connected with the moderation rotation input element of a planetary-gear set.
[0020] Said 3rd clutch has the drum united with the hydraulic servo. Furthermore, this drum It turns for the cylinder of a hydraulic servo carrying out opening, turning to the hydraulic-servo side of the 1st clutch, and being alike, and connects with the moderation rotation input element of a planetary-gear set. The friction member of the 3rd clutch It is effective to consider as the configuration in which the periphery side engaged with the own drum, and the inner circumference side was connected with the drum of the 1st clutch.
[0021] Furthermore, the brake which stops the moderation rotation input element of said planetary-gear set in a change gear case is prepared, and, as for a brake, it is effective to constitute from a band brake which makes the peripheral face of the drum of the 3rd clutch the engagement side of a brake band.
[0022] Furthermore, said moderation planetary gear and planetary-gear set are arranged adjacently, the friction member of the 1st clutch is arranged on the direction outside of a path of moderation planetary gear, and, as for the friction member of the 3rd clutch, it is effective to consider as the configuration arranged on the direction outside of a path of a planetary-gear set.
[0023] Furthermore, it is effective to consider as the configuration in which the drum of the 1st clutch was made for the cylinder which the cylinder of the hydraulic servo of the 3rd clutch was formed behind the cylinder of the hydraulic servo which made the drum of said 1st clutch unify, and was formed back to engage with rotation impossible, and the piston of the hydraulic servo of the 3rd clutch was fitted.
[0024] Furthermore, as for the friction member of said 3rd clutch, it is effective to consider as the configuration whose engaging and releasing the periphery side used the piston of the hydraulic servo of the 3rd clutch as the drum, engaged with this drum, the inner circumference side was connected with the moderation rotation input element of a planetary-gear set, and was enabled by the push length to the drum of the 1st clutch.
[0025] Furthermore, the drum of said 3rd clutch is turned to the sense in which the cylinder of the hydraulic servo united with it carries out opening to a moderation planetary-gear side. It connects with the moderation rotation input element of a planetary-gear set, and, as for the friction member of the 3rd clutch, it is effective to consider as the configuration connected with the drum on which the periphery side engaged with the drum of the 3rd clutch, and the inner circumference side was united with the hydraulic servo of the 1st clutch.
[0026] Furthermore, as for the drum of said 3rd clutch, it is effective that rotation support is carried out through the hydraulic servo united with it by the boss section prolonged from said another wall, and the brake which consisted of band brakes that the moderation rotation input element of a planetary-gear set

should be stopped in a change gear case considers the peripheral face of the drum of the 3rd clutch as the configuration arranged as an engagement side of a brake band.
[0027] Furthermore, the counter driven gear which gears with the counter drive gear which was made to connect with the output element of said planetary-gear set, and was prepared in the periphery of an input shaft, and a counter drive gear is formed, and it can also consider as the configuration which has an input shaft, the counter shaft arranged in juxtaposition, and differential equipment by which is arranged in juxtaposition at a counter shaft and a rotation drive is carried out with a counter shaft.
[0028] Furthermore, as for said counter drive gear, it is also effective to consider as the configuration arranged between the 1st clutch, the 3rd clutch and **** planetary gear, and a planetary-gear set.
[0029] Moreover, said counter drive gear is good also as a configuration arranged between the 2nd clutch and a planetary-gear set.
[0030] Moreover, said counter drive gear can also be considered as the configuration arranged in the opposite side with the 2nd clutch to a planetary-gear set.
[0031] Furthermore, said 1st clutch, the 3rd clutch, and moderation planetary gear are arranged at a connection side with the engine of a change gear, and, as for the 2nd clutch, it is effective to consider as the configuration arranged at the back end side of a change gear.
[0032] Moreover, said 2nd clutch is arranged at a connection side with the engine of a change gear, and the 1st clutch, 3rd clutch, and moderation planetary gear can also be considered as the configuration arranged at the back end side of a change gear.
[0033] Furthermore, as for said each clutch, it is effective to consider as the configuration which had the hydraulic servo, respectively, arranged in order of the hydraulic servo of the hydraulic servo of the 1st clutch, moderation planetary gear, and the 3rd clutch, and has been arranged to a planetary-gear set.
[0034] Or said each clutch is good also as a configuration which had the hydraulic servo, respectively, arranged in order of the hydraulic servo of moderation planetary gear and the 1st clutch, and the hydraulic servo of the 3rd clutch, and has been arranged to a planetary-gear set.
[0035] Moreover, said each clutch is good also as a configuration which had the hydraulic servo, respectively, arranged in order of the hydraulic servo of the hydraulic servo of the 3rd clutch, moderation planetary gear, and the 1st clutch, and has been arranged to a planetary-gear set.
[0036] Moreover, it is made to connect with the output element of said planetary GISESETTO, an output shaft is established, and an output shaft can also take said input shaft and the configuration arranged in same axle.
[0037] In this case, said 1st clutch, the 3rd clutch, and moderation planetary gear are arranged at a connection side with the engine of a change gear, the 2nd clutch is arranged at the back end side of a change gear, and, as for the output element of a planetary-gear set, it is effective to consider as the configuration connected with the output shaft through the periphery of the 2nd clutch.
[0038] Furthermore, as for said each clutch, it is effective to consider as the configuration which had the hydraulic servo, respectively, arranged in order of the hydraulic servo of the hydraulic servo of the 1st clutch, moderation planetary gear, and the 3rd clutch, and has been arranged to a planetary-gear set.
[0039] Furthermore, said each clutch has a hydraulic servo, respectively, and can also consider it as the configuration which arranged in order of the hydraulic servo of moderation planetary gear and the 1st clutch, and the hydraulic servo of the 3rd clutch, and has been arranged to a planetary-gear set.
[0040] Moreover, said each clutch is good also as a configuration which had the hydraulic servo, respectively, arranged in order of the hydraulic servo of the hydraulic servo of the 3rd clutch, moderation planetary gear, and the 1st clutch, and has been arranged to a planetary-gear set.
[0041]
[Function and Effect of the Invention] With the configuration of the claim 1 above-mentioned publication, since the 2nd clutch has been arranged to the opposite side with moderation planetary gear to a planetary-gear set Three persons of moderation planetary gear, the 1st clutch, and the 3rd clutch can be made to be able to approach a planetary-gear set, and can be stationed. The high torque-transmission member which requires the reinforcement corresponding to the magnification torque transmission which connects between the moderation input elements of a planetary-gear set with the output side of moderation planetary gear, the input side of both clutches, and the output side of both clutches can be shortened, and a change gear can be constituted in a lightweight compact.
[0042] next, the structure where the connection member of the 3rd clutch is inevitably located in the periphery of the 1st clutch with a configuration according to claim 2 -- becoming -- the friction member of the 3rd clutch -- a ratio, although constraint produces the friction member of the clutch of BE **** 1 in an

outer diameter By making the projected net area of the hydraulic servo of the 1st clutch increase by input-shaft support, only the part can secure the capacity of the 1st clutch and can prevent increase of the dimension of shaft orientations.
[0043] Moreover, since the supply of oil pressure of the hydraulic servo of the 1st and 3rd clutches is attained from the boss section which is a holddown member by the side of a change gear case with a configuration according to claim 3 The number of the seal rings with which it becomes one place, respectively, and the relative rotation section by 1 set of seal rings leaks, respectively, supply of oil pressure is attained by the stop, and the part which passes along the relative rotation section of the supply oilway to the hydraulic servo of the 1st and 3rd clutches serves as a sliding friction can be lessened.
[0044] furthermore, increase of the shaft-orientations dimension by not both clutches having constraint of the outer diameter of a friction member, being able to secure the capacity by taking the direction dimension of a path enough, and making the configuration number of sheets of a friction member increase for capacity reservation, since the connection member of other clutches does not pass by the configuration according to claim 4 on the periphery of the 1st and 3rd clutches -- **** -- since things are made, it becomes advantageous on compaction of the axial length of a change gear.
[0045] Furthermore, with a configuration according to claim 5, a shaft-orientations dimension can be shortened by arranging the friction member of the 1st and 3rd clutches on the periphery of other members. Moreover, a high torque-transmission path can be shortened a shortened part of the shaft-orientations dimension.
[0046] Furthermore, with a configuration according to claim 6, since the hydraulic servo of the 3rd clutch is arranged at the boss section periphery, in the bore direction, it is hard to expand a projected net area, but since the friction member of the 3rd clutch has been arranged on the periphery of moderation planetary gear, constraint of the diameter expansion to the outer-diameter side of the hydraulic servo of the 3rd clutch is eased, and reservation of the projected net area by diameter expansion becomes easy. Moreover, although only the part by which, as for the hydraulic servo of the 1st clutch, a friction member is arranged by the periphery side becomes difficult, reservation of the projected net area by the diameter expansion by the side of an outer diameter To a bore side, since it is easy to enlarge only the part by input-shaft support, the hydraulic servo of the 1st and 3rd clutches can secure sufficient projected net area now, can prevent the increment in the configuration number of sheets of the friction engagement member accumulated in torque-transmission capacity reservation, and can prevent increase of a shaft-orientations dimension.
[0047] Furthermore, with a configuration according to claim 7, since the output side to the friction member of the 1st clutch will be connected on a clutch drum and connection of an input side will be performed the output element of moderation planetary gear, and directly, it is lessening the connection member which it lets pass in the direction of a path for close and output connection about the friction member of the 1st clutch, and shaft-orientations die length is shortened. And it comes to be able to carry out the short **** configuration also of the high torque-transmission member further with compaction of the axial length by it.
[0048] Furthermore, with a configuration according to claim 8, it becomes possible to approach and to arrange the drum of the 1st clutch, and the drum of the 3rd clutch by communalization of the hub of the 1st and 3rd clutches, and compaction of the further shaft-orientations dimension and compaction of a high torque-transmission member are attained.
[0049] Furthermore, with a configuration according to claim 9, by using a brake with the need of stopping a high torque-transmission member as the band brake which does not require the big direction tooth space of a path,-izing of the outer-diameter dimension of the 1st and 3rd clutches can be carried out [major diameter] as much as possible, compaction of the shaft-orientations dimension of a clutch is attained, and compaction of a high torque-transmission member also becomes possible. Moreover, support of the brake drum accompanying band-izing of a brake can be used also [support / of the drum of the 3rd clutch].
[0050] Furthermore, with a configuration according to claim 10, since the moderation rotation input element of the planetary-gear set with which the 1st clutch is connected carries out high-speed rotation at the time of a high-speed stage, it can be made advantageous to an axial deflection etc. by connecting a drum with the output side of late rotational moderation planetary gear especially about a case so that the 1st clutch may be enlarged by application in a high power engine.
[0051] And with a configuration according to claim 11, a shaft-orientations dimension can be shortened by arranging a friction member on the periphery of other members. Moreover, a high torque-transmission path can be shortened a shortened part of the shaft-orientations dimension.
[0052] Furthermore, with a configuration according to claim 12, the monopoly tooth space between both hydraulic servos is miniaturizable with communalization of the cylinder of the hydraulic servo of both

clutches, putting the drum of one clutch, and the cylinder of one on inside-and-outside physical relationship, and two clutches holding each piston for them by making actuation possible separately as a common cylinder, and enabling substitute actuation.

[0053] Furthermore, with a configuration according to claim 13, since the drum of the 1st clutch is used for the input to the friction member of the 3rd clutch, the number of rotation members is reduced and compaction of the further shaft-orientations dimension and compaction of a high torque-transmission member are attained.

[0054] Furthermore, with a configuration according to claim 14, by using as a band brake a brake with the need of stopping a high torque-transmission member,-izing of the outer-diameter dimension of the 1st and 3rd clutches can be carried out [major diameter] as much as possible, compaction of the shaft-orientations dimension of a clutch is attained, and compaction of a high torque-transmission member also becomes possible. Moreover, support of the brake drum accompanying band-izing can be used also [support / of the drum of the 3rd clutch].

[0055] Furthermore, with a configuration according to claim 15, a shaft-orientations dimension can be shortened by arranging a friction member on the periphery of other members.

[0056] Furthermore, with a configuration according to claim 16, the drum of the 3rd clutch and the drum of the 1st clutch can be communalized, and compaction of the further shaft-orientations dimension and compaction of a high torque-transmission member are attained.

[0057] Furthermore, with a configuration according to claim 17, the combination configuration of the 1st and 3rd clutches can be simplified.

[0058] Furthermore, with a configuration according to claim 18, by making the friction member of the 3rd clutch engage with the 1st clutch directly, the connection member of both clutches can be lost and it becomes miniaturizable [both the clutch configuration member / according to communalization] in part.

[0059] Furthermore, with a configuration according to claim 19, by using as a band brake a brake with the need of stopping a high torque-transmission member,-izing of the outer-diameter dimension of the 3rd clutch can be carried out [major diameter] as much as possible, compaction of the shaft-orientations dimension of a clutch is attained, and compaction of a high torque-transmission member also becomes possible. Moreover, support of the brake drum accompanying band-izing can be used also [support / of the drum of the 3rd clutch].

[0060] Furthermore, the horizontal type multistage automatic transmission for a front engine front drive or rear engine Riyadh live vehicles is realizable with a compact configuration with a configuration according to claim 20.

[0061] Furthermore, with a configuration according to claim 21, compaction of the axial length of the counter shaft in the above-mentioned horizontal type multistage automatic transmission is attained, and it becomes advantageous in respect of weight mitigation.

[0062] Furthermore, with a configuration according to claim 22, a high torque-transmission member is made to the shortest in the above-mentioned horizontal type multistage change gear.

[0063] Furthermore, with a configuration according to claim 23, in the above-mentioned horizontal type multistage change gear, since the end wall of a change gear case can be used for support of a counter drive gear in addition to a high torque-transmission member being made to the shortest, it becomes unnecessary to establish a support wall and compaction of axial length also becomes possible.

[0064] Furthermore, generally with a configuration according to claim 24, a change gear style can shorten a shaft-orientations dimension as a result on loading constraint of a car to compensate for the way of a connection side with an engine being made into a major diameter by arranging a high torque-transmission member to a connection side with an engine.

[0065] Furthermore, with a configuration according to claim 25, since a differential-gear ring wheel is exactly located in the connection side edge section to the engine of a change gear style in the case of a horizontal type multistage change gear, it becomes easy for this location to set [which shortens between the shafts of a differential-gear shaft and a main shaft by arranging the 2nd clutch with a comparatively small capacity] up.

[0066] Furthermore, with a configuration according to claim 26, by arranging the hydraulic servo of the 1st and 3rd clutches on both sides to moderation planetary gear, the moderation planetary gear located in the inside and the friction member to the planetary-gear set located outside can be automatically connected with a simple connection configuration, and a high torque connection member can be shortened.

[0067] On the other hand, with a configuration according to claim 27, since the hydraulic servo of the 1st and 3rd clutches serves as arrangement located in a line side by side, the arrangement location of each

friction member to both hydraulic servos can be set up comparatively freely in the range from the periphery of moderation planetary gear to the periphery of the hydraulic servo of the 3rd clutch.
[0068] Moreover, since the hydraulic servo of the 1st and 3rd clutches serves as arrangement located in a line side by side with a configuration according to claim 28, The arrangement location of each friction member to both hydraulic servos from the periphery of moderation planetary gear It adds to the ability to set up now comparatively freely in the range to the periphery of the hydraulic servo of the 3rd clutch. The arrangement in which the member of the input side of the 1st clutch which always rotates by output rotation of moderation planetary gear is located in the periphery side of a change gear style can be taken now, and detection of the input rotational frequency for gear change control becomes easy.
[0069] Furthermore, the vertical type multistage automatic transmission for front engine Riyadh live vehicles is realizable with a compact configuration with a configuration according to claim 29.
[0070] Furthermore, generally with a configuration according to claim 30, a change gear style can shorten a shaft-orientations dimension as a result on loading constraint of a car to compensate for the way of a connection side with an engine being made into a major diameter by arranging a high torque-transmission member to a connection side with an engine.
[0071] Furthermore, with a configuration according to claim 31, on the occasion of application to the vertical type multistage automatic transmission for front engine Riyadh live vehicles, the moderation planetary gear located in the inside and the friction member to the planetary-gear set located outside can be automatically connected with a simple connection configuration, and a high torque connection member can be shortened by arranging the hydraulic servo of the 1st and 3rd clutches on both sides to moderation planetary gear.
[0072] Moreover, with a configuration according to claim 32, since it becomes the arrangement with which the hydraulic servo of the 1st and 3rd clutches is located in a line side by side on the occasion of application to the vertical type multistage automatic transmission for front engine Riyadh live vehicles, the arrangement location of each friction member to both hydraulic servos can be set up comparatively freely in the range from the periphery of moderation planetary gear to the periphery of the hydraulic servo of the 3rd clutch.
[0073] Furthermore, since it becomes the arrangement with which the hydraulic servo of the 1st and 3rd clutches is located in a line side by side with a configuration according to claim 33 on the occasion of application to the vertical type multistage automatic transmission for front engine Riyadh live vehicles, The arrangement location of each friction member to both hydraulic servos from the periphery of moderation planetary gear It adds to the ability to set up now comparatively freely in the range to the periphery of the hydraulic servo of the 3rd clutch. The arrangement in which the member of the input side of the 1st clutch which always rotates by output rotation of moderation planetary gear is located in the periphery side of a change gear style can be taken now, and detection of the input rotational frequency for gear change control becomes easy.
[0074]
[Embodiment of the Invention] Hereafter, the operation gestalt of this invention is explained along with a drawing. Drawing 1 develops between shafts in a common flat surface, and shows the gear train of 1 operation gestalt of the automatic transmission which materialized this invention by the skeleton. Moreover, drawing 2 shows actual axial physical relationship for the above-mentioned automatic transmission, in view of an end face. The planetary-gear set G which this automatic transmission considers moderation rotation and non-slowing down rotation as an input, and outputs two or more gear change rotations The moderation planetary gear G1 put in order and arranged by the planetary-gear set G and shaft orientations, The input shaft 11 which passes along the inner circumference side of the planetary-gear set G, and the 1st and 3rd clutches (C-1, C-3) which connect an input shaft 11 with two different moderation input elements S2 and S3 of the planetary-gear set G respectively free [engaging and releasing] through the moderation planetary gear G1, It has the 2nd clutch (C-2) which connects an input shaft 11 with the non-slowing down rotation input element C2 (C3) of the planetary-gear set G free [engaging and releasing]. And according to the basic feature of this invention, the 1st clutch (C-1) and 3rd clutch (C-3) are collectively arranged near the moderation planetary gear G1, and the moderation planetary gear G1 are arranged for the 2nd clutch (C-2) to the planetary-gear set G in the opposite side.
[0075] Hereafter, the still more concrete gear train configuration of this automatic transmission is explained. This change gear has taken the gestalt of the horizontal type transformer axle for a front engine front-drive (FF) vehicle or rear engine Riyadh live (RR) vehicles, and as shown in drawing 1 and drawing 2 , it is considered as 3 shaft configurations in which each element of a change gear style was arranged on each shaft of the main shaft X each other arranged in juxtaposition, the counter shaft Y, and the differential-gear

shaft Z. And the change gear style which equips the surroundings of the input shaft 11 on a main shaft X with the planetary-gear set G and the moderation planetary gear G1 which have four gear change elements S2, S3, C2 (C3), and R2 (R3), two brakes (B-1, B-2), and three clutches (C-1, C-2, C-3) is arranged. In this gear train, the input element S3 of one moderation rotation of the planetary-gear set G is connected with an input shaft 11 through the moderation planetary gear G1 with the 1st clutch (C-1). While the input element S2 of another side is connected with an input shaft 11 through the moderation planetary gear G1 with the 3rd clutch (C-3) A stop in the change gear case 10 is enabled by the 1st brake (B-1). While the input element C2 (C3) of non-slowing down rotation is connected with an input shaft 11 with the 2nd clutch (C-2), a stop in the change gear case 10 is enabled by the 2nd brake (B-2). The remaining gear change elements R2 (R3) as an output element It connects with the counter drive gear 19 as an output element on a main shaft X.
[0076] In addition, although the brake (B-2) other than the above was made to stand in a row as an engagement element and the one-way clutch (F-1) is arranged in the gear train shown in drawing This avoids the complicated oil pressure control for a hold substitute of the brake at the time of the 1 ->2 gear change described minutely later (B-2), and a brake (B-1). Except for the above transitional functions, it is [that release control of a brake (B-2) should be simplified] essentially equivalent to a brake (B-2) using the one-way clutch (F-1) which releases the engagement force naturally with engagement of a brake (B-1).
[0077] Moreover, on the main shaft X, it connects with the engine which is not illustrated and the torque converter 4 with a lock-up clutch which transmits the rotation to an input shaft 11 is arranged. And counter gear 2 are arranged on the counter shaft Y. The counter driven gear 21 of the major diameter which counter gear 2 are fixed to the counter shaft 20, and gears on the counter drive gear 19 as an output member on a main shaft X, While being fixed to the counter shaft 20 similarly, arranging the differential-gear drive pinion gear 22 of the minor diameter as an output element on the counter shaft Y and slowing down the output from a main shaft X side by these While obtaining a proper final drive gear ratio by making it reversed and transmitting to differential equipment 3, the function to double the hand of cut of an input shaft 11 and the hand of cut of the output from differential equipment 3 is achieved. Differential equipment 3 is arranged on the differential-gear shaft Z. Differential equipment 3 meshes the differential-gear ring wheel 31 fixed to the differential case 32 to the differential-gear drive pinion gear 22, and is connected with the counter shaft 20, and differential rotation of the differential gear arranged in a differential case 32 is considered as the configuration outputted to a lateral axis 30, and let this output be final wheel driving force.
[0078] The planetary-gear set G is [the carrier C2 (C3) which supports the long pinion P2 which gears with the sun gear S2 of a major diameter, and the sun gear S3 of a minor diameter mutually, and the short pinion P3, and] a ring wheel R2 (R3) (although two gears are constituted theoretically, this ring wheel). Since parenchyma is one gear located only in the periphery side of one of sun gears Writing only one cable address in addition as R2 or R3 according to the location to a sun gear below is constituted. It consists of RABINIYO-type gear sets with which the long pinion P2 gears with to the sun gear S2 and ring wheel R2 of a major diameter, and the short pinion P3 gears to the sun gear S3 of a minor diameter. And with this gestalt, the input element of moderation rotation of the sun gear S2 of a major diameter and the sun gear S3 of a minor diameter and a carrier C2 (C3) are used as the input element of non-slowing down rotation, and let the ring wheel R2 be an output element. The sun gear S3 of the minor diameter of the planetary-gear set G is connected with a clutch (C-1), and while the sun gear S2 of a major diameter is connected with a clutch (C-3), the stop of it in the automatic-transmission case 10 is enabled by the brake (B-1) which consists of band brakes. Moreover, while a carrier C2 (C3) is connected with an input shaft 11 through a clutch (C-2) and the stop of it is enabled by the brake (B-2) at the change gear case 10, the one direction rotation stop of it in the change gear case 10 is enabled with the one-way clutch (F-1). And the ring wheel R2 is connected with the counter drive gear 19.
[0079] The sun gear S1 as the one element is fixed to the change gear case 10, and the moderation planetary gear G1 use a ring wheel R1 as an input element, are connected with an input shaft 11 and connected with the planetary-gear set G by the above-mentioned connection relation through the clutch (C-1) and the clutch (C-3) by using a carrier C1 as an output element.
[0080] The automatic transmission which consists of such a configuration changes gears based on a car load in the range of the gear ratio according to the range chosen by the operator by control by the electronic control and hydraulic control which are not illustrated. Drawing 3 diagrammatizes and shows the gear ratio attained by engagement and release (engagement is expressed with O mark and release is expressed with the-less mark) of each clutch and a brake. Moreover, drawing 4 shows the relation between the gear ratio attained by engagement (those engagement is expressed with - mark) of each clutch and a brake, and the rotational frequency ratio of each gear change element at that time with a velocity diagram. In addition,

while the location of the moderation planetary gear G1 and each gear change element of the planetary-gear set G is expressed as an axis of ordinate at intervals of the direction of an axis of ordinate made to correspond to gear ratio, the rotational frequency ratio of each gear change element is expressed with this velocity diagram on this shaft. When each gear change element is called the 1st - the 4th gear change element one by one from the end (illustration right-hand side) in the direction of an axis of abscissa, and the 1st gear change element It corresponds to the sun gear S3 of a minor diameter, and connects with the path which inputs the rotation slowed down by moderation planetary gear with the 1st clutch (C-1). The 2nd gear change element It corresponds to a ring wheel R2 (R3), and connects with an output member. The 3rd gear change element While connecting with the path inputted with the 2nd clutch (C-2) without corresponding to a carrier C2 (C3) and slowing down rotation of an input shaft A stop is made possible with the 2nd stop element (B-2). The 4th gear change element It corresponds to the sun gear S2 of a major diameter, and while connecting with the path which inputs the rotation slowed down by moderation planetary gear with the 3rd clutch (C-3), it is connected possible [a stop] with the 1st stop element (B-1).

[0081] The 1st ** (1ST) is engagement (in this gestalt, although it replaces with engagement of this brake (B-2) and automatic engagement of an one-way clutch (F-1) is used so that it may understand with reference to an actuation table) of a clutch (C-1) and a brake (B-2) so that both drawings may be combined and referred to and may be known. why the reason for using this engagement and this engagement are equivalent to engagement of a brake (B-2) is explained in full detail behind. It is attained. In this case, reaction force is taken on the carrier C3 on which the rotation slowed down through the moderation planetary gear G1 from the input shaft 11 was inputted into the sun gear S3 of a minor diameter via the clutch (C-1), and was stopped by the change gear case 10 by engagement of an one-way clutch (F-1), and moderation rotation of the maximum reduction gear ratio of a ring wheel R2 is outputted to the counter drive gear 19.

[0082] Next, the 2nd ** (2ND) is attained by engagement of a clutch (C-1) and a brake (B-1). In this case, reaction force is taken to the sun gear S2 of the major diameter by which the rotation slowed down through the moderation planetary gear G1 from the input shaft 11 was inputted into the sun gear S3 of a minor diameter via the clutch (C-1), and was stopped by the change gear case 10 by engagement of a brake (B-1), and moderation rotation of a ring wheel R2 is outputted to the counter drive gear 19. The reduction gear ratio at this time becomes smaller than the 1st ** (1ST) so that it may see to drawing 4 .

[0083] Moreover, the 3rd ** (3RD) is attained by coincidence engagement of a clutch (C-1) and a clutch (C-3). In this case, the rotation slowed down through the moderation planetary gear G1 from the input shaft 11 is inputted into the sun gear S2 of a major diameter, and the sun gear S3 of a minor diameter via a clutch (C-1) and a clutch (C-3) at coincidence. Since the planetary-gear set G will be in a direct connection condition, rotation of the same ring wheel R2 as the input rotation to both sun gears is outputted to the counter drive gear 19 as rotation slowed down to rotation of an input shaft 11.

[0084] Furthermore, the 4th ** (4TH) is attained by coincidence engagement of a clutch (C-1) and a clutch (C-2). In this case, the rotation slowed down through the moderation planetary gear G1 from the input shaft 11 by one side is inputted into the sun gear S3 of a minor diameter via a clutch (C-1). The non-slowing down rotation inputted via the clutch (C-2) from the input shaft 11 on the other hand is inputted into a carrier C2 (C3), and middle rotation of two input rotations is outputted to the counter drive gear 19 as rotation of the ring wheel R2 slightly slowed down to rotation of an input shaft 11.

[0085] Next, the 5th ** (5TH) is attained by coincidence engagement of a clutch (C-2) and a clutch (C-3). In this case, the rotation slowed down through the moderation planetary gear G1 from the input shaft 11 by one side is inputted into the sun gear S2 of a major diameter via a clutch (C-3). The rotation which the non-slowing down rotation inputted via the clutch (C-2) from the input shaft 11 was inputted into the carrier C2 (C3), and accelerated it on the other hand more slightly than rotation of the input shaft 11 of a ring wheel R2 is outputted to the counter drive gear 19.

[0086] And the 6th ** (6TH) is attained by engagement of a clutch (C-2) and a brake (B-1). In this case, non-slowing down rotation is inputted only into a carrier C2 (C3) via a clutch (C-2) from an input shaft 11, and the rotation whose sun gear S2 stopped by the change gear case 10 by engagement of a brake (B-1) accelerated further the ring wheel R2 which takes reaction force is outputted to the counter drive gear 19.

[0087] In addition, go-astern (REV) is attained by engagement of a clutch (C-3) and a brake (B-2). In this case, the rotation slowed down through the moderation planetary gear G1 from the input shaft 11 is inputted into a sun gear S2 via a clutch (C-3), and the inversion of the ring wheel R2 which takes reaction force on the carrier C2 (C3) stopped by engagement of a brake (B-2) change gear case 10 is outputted to the counter drive gear 19.

[0088] Here, the relation of the one-way clutch (F-1) and brake (B-2) which touched previously is

explained. both [these] brakes serve as the so-called friction engagement element with which one release, simultaneously engagement of another side are performed at the time of an up-and-down shift by both gear change interstage and which holds again and is carried out so that it may see in engagement / release relation of both the brakes at the time of the 1st above ** and the 2nd ** (B-1, B-2). A hold substitute of such a friction engagement element will cause addition of the control valve for it, complication of a hydraulic circuit, etc., in order to need the precise concurrency control of the engagement pressure of the hydraulic servo which operates them, and solution pressure discharge and to perform such control. By then, the thing to consider as a setup which doubled the engagement direction of an one-way clutch (F-1) in the reaction force torque support direction at the time of the 1st ** by the 1st ** and the 2nd ** with this gestalt using the reaction force.torque concerning a carrier C2 (C3) being reversed An one-way clutch (F-1) is made to demonstrate a function equivalent to engagement of a parenchyma top brake (B-2). It replaces with engagement of the brake at the time of the 1st ** (B-2) (however, since the direction of the reaction force torque which starts a carrier C2 (C3) in the state of the engine coast of a wheel drive is reversed to the condition of an engine drive). in order to acquire the engine brake effectiveness, as O mark with a parenthesis shows to drawing 3 , engagement of a brake (B-2) is needed -- the carrier C2 (C3) is stopped -- it divides and comes out. Therefore, when attaining a gear ratio, the configuration which attains the 1st ** by engagement of a brake (B-2) can also be taken, without preparing an one-way clutch.

[0089] Thus, each gear ratio attained serves as a good rate step at equal intervals comparatively to each gear ratio so that it may understand qualitatively on the velocity diagram of drawing 4 with reference to spacing of the vertical direction of O mark which shows the velocity ratio of ring wheels R2 and R3. If a numeric value is set up and this relation is expressed quantitatively concretely, it will become the gear ratio shown in drawing 3 . The gear ratio in this case Gear ratio lambda1=44/78 of the sun gear S1 of the moderation planetary gear G1, and a ring wheel R1, If it is set as gear ratio lambda3=30/78 of the sun gear S2 by the side of the major-diameter sun gear of the planetary-gear set G, the sun gear S3 by the side of gear ratio lambda2=36/78 of a ring wheel R2 (R3), and a minor diameter sun gear, and a ring wheel R3 I/O gear ratio The 1st ** : (1ST) (1+lambda1) / the lambda3=4.067 2nd ** : (2ND) (1+lambda1) (lambda2+lambda3) / lambda 3 The =2.354 3rd ** (1+lambda2) : The 1+lambda1=1.564 4th ** (3RD) (4TH) :(1+lambda1)/ (1+lambda1-lambda1, lambda 3) =1.161 the 5**(5TH): (1+lambda1) -- /(1+lambda1+lambda1, lambda 2) =0.857 the 6**(6TH): -- 1/(1+lambda2) =0.684 go-astern (REV): -- it is set to -(1+lambda1)/lambda2=-3.389. and the step between these gear ratio -- the -- the [1 and / between the 2nd speed / :1.73] -- the [2 and / between the 3rd speed / :1.51] -- the [3 and / between the 4th speed / :1.35] -- it is set to :1.25 between 4, and the :1.35 5-6th ** between the 5th speed.

[0090] Next, drawing 5 shows the whole automatic-transmission configuration in the cross section materialized further. Moreover, drawing 6 and drawing 7 expand and show a part of drawing 5 . Although the same reference mark is attached and being replaced with explanation about each component previously explained with reference to the skeleton, the details which cannot be referred to from a skeleton are explained [detail / of drawing 5 and each part] with reference to drawing 6 and drawing 7 about overall physical relationship. In addition, vocabulary called a clutch and a brake shall name generically a hydraulic servo equipped with the cylinder united with the drum as the friction member and actuation device as the drum as a connection member to those input-output elements, a hub, and an engaging-and-releasing member through this specification. Therefore, the 1st clutch (C-1) is the friction member 63 and a hydraulic servo 6, similarly, the 2nd clutch (C-2) is the friction member 53 and a hydraulic servo 5, the 3rd clutch (C-3) consists of a friction member 73 and a hydraulic servo 7, and the brake (B-2) is constituted from the friction member 93 and the hydraulic servo 9 by each clutch and the brake. In addition, since only a brake (B-1) is considered as a band-brake configuration, a friction member shall be used as the band 83 which concludes a drum, and it shall have the hydraulic servo which is not illustrated.

[0091] front end wall 10A by which the change gear case 10 consists of an oil pump cover of case body 10B equipped with 10f of peripheral wall sections whose diameter is expanded in the shape of a taper toward the front from back end wall 10e, the oil pump body which closes opening of the front end, and immobilization in it, and bolt stop immobilization is carried out at case body 10B, and ****** of case body 10B -- support wall 10C by which bolt stop immobilization is carried out is mostly consisted of by the center section. And spline 10g which reaches back end wall 10e mostly from opening of the front end is formed, and that the back end of an input shaft 11 should be supported, after projecting ahead from a back end wall, annular wall 10e' which constitutes the inner circle wall of the cylinder of the hydraulic servo of the brake (B-2) a full account of is given side boss section 10b later is formed in 10f inside of peripheral wall sections of body 10B at back end wall 10e. Moreover, before projecting in back from an oil pump cover, side boss section

10a is formed in front end wall 10A. Furthermore, the inner circumference is back extended in support wall 10C, and 10h of central boss sections which constitute the supporter of the counter drive gear 19 is formed in it.

[0092] An input shaft 11 is divided into order biaxial 11A and 11B from on [of processing] expedient, connection unification is mutually carried out by spline engagement, supply oilway 11r of lubricous ** and supply oilway 11p of servo ** are formed in the shaft of axial first portion 11A, and 11s of lubrication pressure-oil ways is formed in the shaft of section 11B in the second half of a shaft. Moreover, flange 11a is formed in the periphery of the back end approach of axial first portion 11A, and flange 11b is formed in the periphery of the back end approach of section 11B in the second half of a shaft. And axial first portion 11A is the direct anterior part of inner circumference side [of an oil-pump arrangement location], and flange 11a. It is supported by the sleeve shaft 13 fitted in the inner circumference of before side boss section 10a through the bush, respectively. In the second half of a shaft section 11B Are spline engagement to axial first portion 11A about the front end, and the direction support of a path of the back end is carried out through bearing at backside [a case 10] boss section 10b. Shaft-orientations support is carried out by thrust bearing infixed between each flange 11a and 11b and both the boss section tips which were made to adjoin a supporter and were formed.

[0093] The planetary-gear set G is arranged in the second half of the shaft of an input shaft 11 at the periphery of section 11B, both-ends support of the sun gear S3 is carried out respectively through a bush in the second half of a shaft at section 11B in the gear section and extension stem section, and both-ends support of the sun gear S2 is carried out respectively through the bush at the extension stem section of a sun gear S3 in the gear section and extension stem section. The cantilevered suspension of the carrier C2 (C3) is carried out to the extension stem section of a sun gear S2 through a bush in the front end side, and a ring wheel R2 is spline connection through flange material, and is supported by the counter drive gear 19. And as for the sun gear S2 of the planetary-gear set G, the extension stem section is connected with the power transfer member 14 by spline engagement, and the power transfer member 14 is connected with the drum 72 of the 3rd clutch (C-3) by end-face engagement. Moreover, as for the sun gear S3, the extension stem section is connected with the extension stem section of the cylinder 60 of the hydraulic servo of the 1st clutch (C-1) by spline engagement. And the carrier C2 (C3) is connected with the member which unified the hub 54 of the 2nd clutch and the hub of the 2nd brake (B-2) which are fixed to the back end and extend the periphery side of the planetary-gear set G toward the front, and the inner ball race of an one-way clutch (F-1). Furthermore, the ring wheel R2 is connected with the counter drive gear 19 through the connection member as mentioned above.

[0094] The moderation planetary gear G1 fix the sun gear S1 as a reaction force element to the back end section of the sleeve shaft 13 which fitting immobilization is carried out at the inner circumference of before side boss section 10a, and fixes the stator of a torque converter to an oil pump cover through an one-way clutch in the front end section by spline engagement. The ring wheel R1 as an input element is made to connect with the periphery of flange 11a of an input shaft 11 by spline engagement, and it is arranged at the before [a change gear style] side. And the carrier C1 as an output element is being fixed to the hub 74 common to the 1st and 3rd clutches which describe the front end side minutely later.

[0095] Next, the hydraulic servos 6 and 7 of the 1st and 3rd clutches (C-1, C-3) are arranged at the sense in which the cylinders 60 and 70 facing each other [6 and 7], i.e., hydraulic servos, carry out opening to the both sides on both sides of the moderation planetary gear G1 in order at the moderation planetary-gear G1 side. And the hydraulic servo 6 of the 1st clutch is supported by the back end section periphery of axial first portion 11A of an input shaft free [rotation] by supporter 62a, and consists of the cylinder 60 which had the drum 62 fixed to a periphery side, a piston 61 fitted in the cylinder 60 free [sliding], a cancellation plate 65 which offsets the centrifugal oil pressure concerning the tooth back of a piston 61, and a return spring 66. The feeding and discarding of servo ** to this hydraulic servo are performed through oilway 11within shaft p of axial first portion 11A.

[0096] It is arranged at the inner circumference side of the friction member 63 of this clutch, and the sun gear S3 of the planetary-gear set G is made to carry out spline connection in the extension stem section, and let the cylinder 60 of this 1st clutch (C-1) be the member which transmits power to the sun gear S3 of the planetary-gear set G from the drum 62 of the 1st clutch. And it is supported by input-shaft first portion 10A by the inner circumference side of support 10C as supporter material of the counter drive gear 19 which transmits the output from the ring wheel R3 of the planetary-gear set G to the counter shaft 20.

[0097] By such configuration, in transfer, power from the 1st clutch (C-1) to the sun gear S3 of the planetary-gear set G can be performed without making the member according to rank for power transfer

placed between shaft orientations using the cylinder 60 of the 1st clutch, and compaction of the axial length by it is made [power]. Moreover, even the shaft-orientations length corresponding to arrangement spacing of the seal ring which acts as the shaft-orientations length of a hydraulic servo 6 by arranging supporter 62a of the drum 62 through the hydraulic servo 6 of the 1st clutch to the inner circumference side of the power transfer member 14 so that a substantial shaft-orientations tooth space may not be required, and acts the sealing device of the supply way of servo ** to this hydraulic servo on shaft-orientations both sides makes it thin, and compaction of the axial length of a change gear style is made, supporting the clutch drum 62 certainly.

[0098] The hydraulic servo 7 of the 3rd clutch is supported by the periphery of before side boss section 10a free [rotation] through a bush by supporter 72a, and consists of the cylinder 70 which expanded the diameter of a periphery side and was used as the drum 72, a piston 71 fitted in the cylinder 70 free [sliding], a cancellation plate 75 which offsets the centrifugal oil pressure concerning the tooth back of a piston 71, and a return spring 76. The feeding and discarding of servo ** to this hydraulic servo 7 are performed through oilway 10within case q formed in before side boss section 10a.

[0099] The friction member 63 of the 1st clutch (C-1) and the friction member 73 of the 3rd clutch (C-3) are put in order and arranged at the periphery side of the moderation planetary gear G1. And the friction member 63 of the 1st clutch (C-1) The back up plate which consisted of the friction material and separator plates of many plates which made the hub 74 carry out spline engagement of the inner circumference side, and made the drum 62 carry out spline engagement of the periphery side, and was fixed at the tip of a drum 62, The clutch engagement actuation pinched at the piston 61 extruded by supply of the oil pressure into a hydraulic servo 6 from a cylinder 60 considers as the configuration which transmits torque to a drum 62 from a hub 74.

[0100] The friction member 73 of the 3rd clutch (C-3) The back up plate which consisted of the friction material and separator plates of many plates which made the hub 74 carry out spline engagement of the inner circumference side, and made the drum 72 carry out spline engagement of the periphery side, and was fixed at the tip of a drum 72, The clutch engagement actuation pinched at the piston 71 extruded by supply of the oil pressure into a hydraulic servo 7 from a cylinder 70 considers as the configuration which transmits torque to a drum 72 from a hub 74.

[0101] Two clutches (C-1, C-3), the 1st which transmits the moderation torque outputted from the moderation planetary gear G1 to the planetary-gear set G, and the 3rd, thus, to the latest of the moderation planetary gear G1 Since it becomes the configuration surrounded by the friction members 63 and 73 by the side of the periphery of the moderation planetary gear G1, and the hydraulic servos 6 and 7 of order, only in and the interior which had the power transfer at both clutches (C-1, C-3) from the moderation planetary gear G1 surrounded To the hub 74 common to both clutches, without allotting the member according to rank from a carrier C1 A direct deed, While passing through two clutches enables it to perform transfer in the planetary-gear set G of power through the 1st hydraulic servo 6. The number of the members which need the support to a shaft for power transfer, and are put on shaft orientations is reduced by the direct power transfer at both clutches (C-1, C-3) from the moderation planetary gear G1, and the power transfer using the hydraulic servo 6 of the 1st clutch. Therefore, the axial length of a change gear style is shortened by this configuration. Moreover, the transfer path of moderation torque is concentration-ized, and since multiaxial structure which lets the shaft for power transfer pass to the inner circumference side of the planetary-gear set G by complication of the input path of the moderation torque to the planetary-gear set G and the input path of non-slowing down torque is abolished, the light weight of a change gear and miniaturization are made.

[0102] Moreover, it is related with connection to the planetary gear G of the 1st clutch (C-1) which lets between the connection section mutual [these] accompanying division before and after an input shaft 11, and the peripheries of an input shaft 11 and counter drive gear inner circumference pass, and the 3rd clutch (C-3). Input-shaft first portion 11A and the second half The spline connection section of section 11B, the spline connection section of the extension stem section of a sun gear S3, and the extension stem section of a cylinder 60, And since the spline connection section of the extension stem section of a sun gear S2 and the power transfer member 14 is mutually shifted by shaft orientations, major-diameter-ization by the lap of the direction of a path of these three connection sections is prevented, and it has compact composition.

[0103] On the other hand, it is arranged after the planetary-gear set G at a side, i.e., the backmost part of a change gear style, an inner circumference side is connected with flange 11b of section 11B in the second half of an input shaft, and the hydraulic servo 5 of the.2nd clutch consists of the cylinder 50 which carried out diameter expansion extension of the periphery side, and was used as the drum 52, a piston 51 fitted in the cylinder 50, a cancellation plate 55 of centrifugal oil pressure, and a return spring 56. The feeding and

discarding of the oil pressure of this hydraulic servo 6 are performed through 10t of oilways within a case formed in backside [a change gear case] boss section 10b.
[0104] The friction member 53 of the 2nd clutch (C-2) To the part which is the back by the side of the periphery of the planetary-gear set G, and does not have a ring wheel The back up plate which consisted of the friction material disks and separator plates of many plates which made the hub 54 carry out spline engagement of the inner circumference side, and made the drum 52 carry out spline engagement of the periphery side, and was fixed at the tip of a drum 52, The clutch engagement actuation pinched at the piston 51 extruded by supply of the oil pressure into a hydraulic servo 5 from a cylinder 50 considers as the configuration which transmits torque to a hub 54 from a drum 52.
[0105] Thus, it is related with the 2nd clutch (C-2) and 2nd brake (B-2). It compares with the 1st and 3rd clutches by transmitting the torque which is not slowed down. The friction member 53 of the 2nd clutch (C-2) with a small torque capacity Major-diameter-ize by arranging to the periphery side of the planetary-gear set G, and capacity is earned by the friction member side. Since it becomes the arrangement which put the hydraulic servo 9 of the 2nd brake (B-2) on the periphery side of the hydraulic servo 5 of the 2nd clutch which minor-diameter-ized only the part in the direction of a path, compaction of the further change gear axial length is made by arrangement of both the hydraulic servos that used the direction tooth space of a path effectively.
[0106] Next, the 1st brake (B-1) is used as a band brake, and the brake band 83 is considered as the configuration which binds the peripheral face of the drum 72 of the 3rd clutch (C-3) tight as an engagement side. By this, the 1st brake (B-1) will not require a shaft-orientations tooth space, but will be arranged, without moreover making most direction dimensions of a path increase. In addition, the hydraulic servo of this band brake is the same shaft-orientations location as a brake band 83, and since it is what is prolonged in a tangential direction to a drum 72, it is omitting illustration. Thus, the clutch drum 72 which supports the friction member 73 of the 3rd clutch arranged at the periphery side of moderation PURANERARIGIYA G1 is used as the drum of the 1st brake. And since supporter 72a of this drum has been arranged in the location which laps with the sun gear S1 of the moderation planetary gear G1, both the direction tooth space of a path for brake drum arrangement and the shaft-orientations tooth spaces for drum support are reduced, and the outer diameter of a change gear style and compaction of axial length are made. And the stable brake performance can be obtained, using a clutch drum, since it becomes the configuration which supported the drum concluded in a band 83 to before [a case] side boss section 10a by the inner circumference side of the conclusion section.
[0107] The 2nd brake (B-2) is considered as a multi-plate configuration like each clutch. The friction member 93 It is arranged ahead by the side of the periphery of the planetary-gear set G. The hydraulic servo 9 of the 2nd brake It is arranged at back end wall 10e of the case 10 by the side of the periphery of the hydraulic servo 5 of the 2nd clutch, and press of the friction member 93 of the 2nd brake is enabled through the outside of the friction member 53 of the 2nd clutch, and it compares with an one-way clutch (F-1), and is arranged. And the hydraulic servo 9 of the 2nd brake (B-2) is formed with the gestalt which made the piston 91 fit in back end wall 10e of the change gear case 10, and made the cylinder build in it. Furthermore, in detail, baffle support of the separator plate of the friction member 93 is carried out by spline engagement in those periphery side at 10f of peripheral wall sections of a case 10, and baffle support of the friction material disk is carried out by spline engagement in those inner circumference side in the clutch hub 54 and the brake hub of one. Moreover, a hydraulic servo 9 is considered as the configuration which fitted the annular piston 91 in the cylinder demarcated by 10f of peripheral wall sections of a case 10, back end wall 10e, and annular wall 10e' prolonged in shaft orientations from back end wall 10e, and the extension of a piston 91 is considered as the arrangement which stands face to face against the friction member 93 through the periphery of the drum 52 of the 2nd clutch. the -- two -- a brake (B-2) -- a hydraulic servo -- nine -- a return spring -- 96 -- the -- a receptacle -- the section -- 96 -- ' -- the -- two -- a brake (B-2) -- friction -- a member -- 93 -- supporting -- a spline -- ten -- f -- a crevice -- ten -- g -- ' -- arranging -- having -- **** .
[0108] Thus, by arranging the return spring 96 and receptacle section 96' of the hydraulic servo 9 of the 2nd brake to 10g [of spline 10g / of a case 10 / crevices]', about the return spring 96, arrangement which does not require an arrangement-on parenchyma tooth space can be realized, and, only in the part, the case outer diameter of a change gear is small.
[0109] Next, about support of the counter drive gear 19, this gear 19 is supported by the periphery of 10h of boss sections prolonged back through bearing 12 in the inner circumference of support 10C which constitutes the supporter material. This support 10C carries out the bolt stop of the periphery side to the end face of the heights of the spline in the level difference section of case body 10B which expands the diameter

of pars intermedia a little mostly, and is formed, and is being fixed to case body 10B so that it may understand with reference to drawing 5 .
[0110] To the input shaft 10 with which the change gear style has been arranged as mentioned above, in the front end section of the counter shaft 20, the differential-gear drive pinion gear 22 which gears in piles to shaft orientations at the differential-gear ring wheel 31 of differential equipment 3 is arranged with the gestalt which cuts and lacks a part of oil pump body at front end wall 10A so that it may understand with reference to drawing 5 . The before [the counter shaft 20] side is supported by case body 10B through bearing with arrangement of the differential-gear drive pinion gear 22 to this foremost part behind the differential-gear drive pinion gear 22. And from this physical relationship, the hydraulic servo 7 of the 3rd clutch (C-3) is arranged in the location which lapped in the differential-gear ring wheel 31 and the direction of a path, and the friction member 73 of the 3rd clutch is considered as the arrangement which lapped with the differential-gear ring wheel 31 and shaft orientations in part on the periphery of moderation PURANERARIGIYA G1.
[0111] Such arrangement is arranging the differential-gear drive pinion gear 22 ahead as much as possible. The lap of the direction of a path of the differential-gear ring wheel 31 and the friction member 73 of the 3rd clutch is abolished. It is useful to losing constraint of the direction dimension of a path of the friction member 73, and securing capacity, and by interference with the differential-gear ring wheel 31 by compaction of a wheel base, or expansion of the diameter of a gear, even if the hydraulic servo 7 of the 3rd clutch minor-diameter-izes, it makes it possible to obtain sufficient clutch capacity. Therefore, by this configuration, when taking a fixed wheel base between an input shaft 10 and the differential-gear shaft 30, it is useful to increasing the degree of freedom of a differential-gear ratio setup by enlarging width of face of selection of the diameter of a differential-gear ring wheel, or compaction of a wheel base is also made easy.
[0112] Next, drawing 8 shows the 1st modification which transferred only the counter drive gear 19 to the backmost part of a change gear in the cross section [-izing / the cross section / the ** type] in the same element arrangement of each as the 1st operation gestalt and parenchyma. In the case of this gestalt, the hydraulic servo 5 of the 2nd clutch is supported by the periphery of section 11B in the second half of an input shaft, and, instead, the counter drive gear 19 is supported by backside [the 2nd] boss section 10b' of the major diameter of case body 10B. Moreover, the hydraulic servo 9 of the 2nd brake is arranged considering the level difference section of case body 10B as a cylinder.
[0113] The advantage by this 1st modification is in the point out of which it comes by reducing the diameter of the back end section periphery of case body 10B according to the outer diameter of the counter drive gear 19 to minor-diameter-ize the gear change back end section, and the loading nature of a change gear can be raised as compared with axial length because this minor-diameter-izes especially the back end section that is easy to produce interference with the car side member at the time of car loading.
[0114] Drawing 9 shows similarly the 2nd modification which arranged the counter drive gear 19 between the planetary-gear set G and the 2nd clutch (C-2) in the cross section [-izing / the cross section / the ** type] in the same element arrangement of each as the 1st operation gestalt and parenchyma. In the case of this gestalt, the counter drive gear 19 is supported by 10h of boss sections ahead prolonged from support 10C fixed to 10f of peripheral walls of case body 10B. It follows on this. In the relation between the planetary-gear set G and the 2nd clutch (C-2) Since the counter drive gear 19 will be located among both, the hub 54 of the 2nd clutch is ahead extended in accordance with an input shaft 11. Similarly the axial supporter of the carrier C2 (C3) of the planetary-gear set G is back extended in accordance with an input shaft 11, and it considers as the configuration which carries out spline engagement connection of both shaft-orientations extensions by the inner circumference side of support 10C which supports the counter drive gear 19. Moreover, about the hydraulic servo 9 of a brake (B-2), it considers as a configuration equipped with the original cylinder 90 fixed to 10f of peripheral walls of case body 10B. In addition, although the location of a brake (B-2) and an one-way clutch (F-1) is reversed in this case, this is transferring the ring wheel R2 of the planetary-gear set G to the periphery side of the sun gear S3 of a minor diameter, and is for securing servo capacity by arranging a cylinder 90 into the part which lacks a ring wheel on a periphery.
[0115] The advantage by this 2nd modification is locating the 2nd small clutch (C-2) of a torque load in the backmost part, and since it serves as arrangement which packs each element of a high torque load and is brought near ahead relatively, it is in the point that the rigid maintenance as the whole change gear becomes easy. Moreover, since the relation of hydraulic pressure supply can follow the configuration of the 1st operation gestalt, it becomes advantageous in respect of mitigation of the sliding friction by the seal ring to the 1st modification.
[0116] By the way, with each above-mentioned gestalt, although the moderation planetary gear G1

(henceforth [these 3 person is named generically and] a high torque-transmission system) are arranged in the 1st and 3rd clutch (C-1, C-3) lists at the connection side with the engine in a change gear, these can also be arranged to the back end side of a change gear with-related [the same configuration and connection-related / same]. Drawing 10 shows the 3rd modification which takes such a configuration in the cross section [-izing / the cross section / the ** type]. With this gestalt, arrangement of the planetary-gear set G, the moderation planetary gear G1, and three clutches (C-1 to C-3) was altogether made into the reverse sense to the 1st operation gestalt, and the counter drive gear 19 is arranged between the 2nd foremost clutch (C-2) and the planetary-gear set G. And about the ring wheel R2 of the planetary-gear set G, it is prepared in the periphery side by the side of the sun gear S3 of a minor diameter in the semantics which shortens a connection path with the counter drive gear 19. It considers as the arrangement which does not change the sense and relative-position relation between the 2nd brake (B-2) and an one-way clutch (F-1) in order to locate the hydraulic servo 9 of the 2nd brake (B-2) in the periphery of the side which does not have the ring wheel of the planetary-gear set G by the same reason as the case of the 2nd modification of the above in connection with this.

[0117] When taking such arrangement, after the sun gear S1 of the moderation planetary gear G1 is prolonged from case body 10B, it is fixed to side boss section 10b, the hydraulic servo 6 of the 1st clutch is also supported by backside boss section 10b, and the hydraulic servo 7 of the 3rd clutch is supported by section 11B in the second half of an input shaft. Moreover, the hydraulic servo 5 of the 2nd clutch is supported by before side boss section 10a. Furthermore, the hydraulic servo 9 of the 2nd brake is considered as a configuration with the original cylinder 90 fixed to 10f of case body peripheral walls. moreover, in the relation between the planetary-gear set G and the 2nd clutch (C-2) Since the counter drive gear 19 will be located among both, the hub 54 of the 2nd clutch is back extended along with input-shaft first portion 11A. Similarly the carrier C2 (C3) of the planetary-gear set G is ahead extended along with input-shaft first portion 11A, and it considers as the configuration which carries out spline engagement connection of both shaft-orientations extensions by the inner circumference side of support 10C which supports the counter drive gear 19.

[0118] The advantage of this 3rd modification has a small torque-transmission capacity in order not to participate in transfer of moderation torque. Since it becomes the relation in which the 2nd clutch (C-2) which can make the outer diameter of a friction member small by that cause is located in the method of the forefront, adjoins it, and the counter drive gear 19 is located, It is in the point whose degree of freedom of a setup of the wheel base (a setup of differential-gear gear ratio is influenced) of the main shaft X and the differential-gear shaft Z of the clutch friction member 53 and the differential-gear ring wheel 31 which constraint of interference is eased and are shown in drawing 1 increases. And in order that the location of the counter driven gear 21 and the differential-gear drive pinion gear 22 which gear on the counter drive gear 19 may approach, the weight mitigation by compaction of the counter shaft 20 also becomes possible.

[0119] When this point is explained further in full detail, the clutch (C-2) which carries out the direct input of the rotation of an input shaft 11 to a carrier C2 (C3) is a clutch which is not engaged at the time of the advance 1st speed (1ST) - the 3rd speed (3RD), and go-astern (REV) so that clearly from explanation of a previous gear ratio. Therefore, this clutch (C-2) does not pay the magnification torque by moderation so that the urinal stall torque which amplified the engine torque from a torque converter 4 like [at the time of a car halt] may not be received and it may understand with reference to the velocity diagram of drawing 4 by contrast with other two clutches (C-1, C-3). Therefore, this clutch (C-2) can be used as a clutch with a small torque capacity (this capacity is decided by the number of sheets of the diameter of a clutch, and a friction member) as compared with other clutches. Therefore, only the part which made the diameter of a clutch small can enlarge the diameter of a gear of the differential-gear ring wheel 31 to the wheel base of a main shaft X and the differential-gear shaft Z by making this diameter of a clutch small from the axial physical relationship shown in drawing 2 .

[0120] Next, also in the configuration which arranges a high torque-transmission system to the back end side of a change gear as mentioned above, modification of the element location of the same complementary of the as said each modification is possible. <A HREF="/Tokujitu/tjitemdrw.ipdl?N0000=237&N0500=1E_N/;> ===?8?;///&N0001=722&N0552=9&N0553=000013" TARGET="tjitemdrw"> drawing 11 shows the 4th modification which has arranged the counter drive gear 19 between the planetary-gear set G and the 1st clutch (C-1) in the cross section [-izing / the cross section / the ** type]. Since the counter drive gear 19 is located in the sun gear S2 side of a major diameter to the planetary-gear set G in the case of this gestalt, from the reason connection-related [the / as the case of the 3rd modification of the above / same], the ring wheel R2 of the planetary-gear set G was arranged in the sun

gear S2 side of a major diameter, and has reversed the physical relationship of the 2nd brake (B-2) and an one-way clutch (F-1) to the 3rd modification in connection with it.
[0121] Although the point that only the part by which the transfer path of moderation torque pass along the inner circumference of support wall 10C become long from the 3rd modification of the above in the case of this 4th modification cannot be deny , the advantage to which the rigidity of a change gear can be raise and the connection path of the 2nd clutch (C-2) and the planetary gear set G become short by place further ahead the planetary gear set G which be the amount element of Oshige from the 3rd modification be acquire .
[0122] Next, with said each operation gestalt, it is related with the 1st and 3rd clutches (C-1, C-3). The hydraulic servos 6 and 7 of these clutches The both sides of the moderation planetary gear G1, Namely, although the hydraulic servo 7 of the moderation planetary gear G1, and the during the planetary-gear set G and the 3rd clutch divides between the moderation planetary gear G1, front wall 10A, or back end wall 10e and the hydraulic servo 6 of the 1st clutch is arranged These hydraulic servos 6 and 7 can be summarized to the one side of the moderation planetary gear G1, and can also be arranged. Drawing 12 shows the 2nd operation gestalt which takes such a configuration in the cross section [-izing / the cross section / the ** type].
[0123] In the case of this gestalt, both the drums 62 and 72 united with the hydraulic servos 6 and 7 of both clutches are supported by the before [the change gear case 10] side boss section 10a periphery, the inner circumference side of the cylinder 60 of the 1st clutch is connected with the carrier C1 of the moderation planetary gear G1, and the periphery side of a cylinder 60 is made into the hub of the 3rd clutch (C-3), and let the diameter expansion section be the own drum 62. Therefore, about the friction member 63 of the 1st clutch, the inner circumference side is connected with the sun gear S3 of the minor diameter of the planetary-gear set G through a hub 64, and it considers as the configuration in which the periphery side engaged with the drum 62. Moreover, about the friction member 73 of the 3rd clutch, the inner circumference side engages with the periphery of the cylinder 60 of the 1st clutch (C-1), and it considers as the configuration which a periphery side connects with the sun gear S2 of the major diameter of the planetary-gear set G through the own drum 72.
[0124] In the case of this 2nd operation gestalt, both the supply oilways 10p and 10q of the hydraulic servos 6 and 7 of both clutches are formed in boss section 10a, and since both the one relative rotation section that crosses an oilway becomes, as compared with said each gestalt, the advantage which can reduce the sliding friction by the seal ring is acquired.
[0125] Here, in the oilway for supplying a lubricating oil to the whole oilway or whole automatic transmission which supplies oil pressure to the hydraulic servo of a clutch, the number of seal rings arranged in order to prevent the leakage of the oil between the oilways of the member which carries out relative rotation, and the number of the oilway formed by lapping in a shaft are considered. When there were many seal rings via which one oilway goes, cost not only starts, but a sliding friction increases by a pressure being applied to a seal ring and a power transmission efficiency is considered in the condition that oil pressure is applied to the oilway, there is a fault that a loss becomes large. Therefore, little way of a seal ring is good. Moreover, if there are many oilways arranged by lapping in a shaft, a shaft diameter must be enlarged from the problem on the reinforcement of a shaft. Therefore, if there are many oilways arranged by lapping in a shaft, since the direction dimension of a path of an automatic transmission will become large so much, little way of the oilway within a shaft is good. With this operation gestalt, the seal ring of a pair is arranged about a seal ring at oilway 10q from the oilway formed in before [the change gear case 10] side boss section 10a to the hydraulic servo 7 of the 3rd clutch (C-3). The seal ring of a pair is arranged at oilway 10p from the oilway similarly formed in before side boss section 10a to the hydraulic servo 6 of the 1st clutch (C-1). Moreover, the seal ring of a pair is arranged at the oilway from 10t of oilways formed in backside [the change gear case 10] boss section 10b to the hydraulic servo 5 of the 2nd clutch (C-2). Furthermore, one seal ring is arranged at the oilway formed in backside [the change gear case 10] boss section 10b, and the oilway which connects 11s of lubricating oil ways formed in the input shaft 11. Therefore, a total of three pairs and one seal ring will be arranged. Moreover, there is no lapping oilway about the oilway formed in a shaft. Thus, in this operation gestalt, since the number of seal rings and the oilway within a shaft can be lessened, the effectiveness that there are few losses in power transfer and they can consider as an automatic transmission with the small direction dimension of a path is also acquired.
[0126] About the case where the configuration which put such 1st and 3rd clutches (C-1, C-3) in order is taken as well as the case of the 1st operation gestalt, various kinds of deformation is possible. Drawing 13 shows the 2nd modification and the 5th modification which took the same element arrangement on the basis

of the 2nd operation gestalt in the cross section [-izing / the cross section / the ** type]. The advantages and disadvantages to the 2nd operation gestalt in this case are the same as that of the relation of the 2nd modification over the 1st operation gestalt.
[0127] Next, drawing 14 shows the 1st modification and the 6th modification which added the same alteration to the 2nd operation gestalt in the cross section [-izing / the cross section / the ** type]. The advantages and disadvantages to the 2nd operation gestalt in this case are the same as that of the relation of the 1st modification over the 1st operation gestalt.
[0128] Furthermore, drawing 15 shows the 4th modification and the 7th modification which added the same alteration to the 2nd operation gestalt in the cross section [-izing / the cross section / the ** type]. The advantages and disadvantages to the 2nd operation gestalt in this case are the same as that of the relation of the 4th modification over the 1st operation gestalt.
[0129] Next, drawing 16 is the 1st and 3rd clutches (the 3rd operation gestalt which reversed the physical relationship of C-1 and C-3 is shown.) to the 1st operation gestalt. With this gestalt, the hydraulic servo 6 of the 1st clutch (C-1) is arranged between front end wall 10A and the moderation planetary gear G1, and the hydraulic servo 7 of the 3rd clutch (C-3) is arranged between the moderation planetary gear G1 and support wall 10C. And before the hydraulic servo 6 of the 1st clutch (C-1) is prolonged from front end wall 10A, it is supported by the periphery of side boss section 10a, and hydraulic pressure supply of it is made possible from oilway 10p of before side boss section 10a. On the other hand, the hydraulic servo 7 of the 3rd clutch (C-3) is supported by the boss section 10i periphery ahead prolonged from support wall 10C, and hydraulic pressure supply of it is made possible from oilway 10u of boss section 10i. In this case, although the point that the moderation planetary gear G1 are supported by the periphery of before side boss section 10a is the same as the 1st operation gestalt, the carrier C1 as that output element is connected with the inner circumference side of the cylinder 60 of the hydraulic servo 6 of the 1st clutch. Moreover, the cylinder 70 of the hydraulic servo 7 of the 3rd clutch is fixed to the member which connects it with the sun gear S2 of the major diameter of the planetary-gear set G, and a connection member is supported by the inner circumference of boss section 10i of support wall 10C in the inner circumference side of the band conclusion location of the band brake (B-1) to the drum 72 of the 3rd clutch.
[0130] In the case of this 3rd operation gestalt, the 1st operation gestalt is received. The die length of a high torque-transmission system Although the point that only the part which goes via the 1st cylinder 60 and drum 62 of a hydraulic servo 6 of a clutch becomes long cannot be denied, since the hydraulic pressure supply to the hydraulic servo of all clutches can carry out directly from each boss section, The number of the seal rings to need serves as min in all the operation gestalt, and the reduction effectiveness of frictional resistance is demonstrated by max.
[0131] Also in the configuration based on the 3rd operation gestalt of such clutch arrangement, array modification of other elements is possible like the case of the 1st operation gestalt. Drawing 17 shows the 8th modification as such an example in the same cross section [-izing / the cross section / the ** type]. This example reverses all arrays to the 3rd operation gestalt approximately. The advantage in this case is the same as that of the 4th modification described above with reference to drawing 11 .
[0132] Next, drawing 18 - drawing 20 show the 4th operation gestalt of this invention. As develop between shafts to drawing 18 in a common flat surface, a skeleton shows that gear train to it, an actual cross section is shown in drawing 19 and that part is expanded and shown in drawing 20 , with this 4th operation gestalt Since the almost same element arrangement as the 3rd modification generally shown in drawing 10 of the previous 1st operation gestalt is taken, the same sign as each element with which it was expressed to the cross section of the skeleton of drawing 18 , drawing 19 , and drawing 20 , therefore a corresponding element is attached, and it replaces with explanation of an intersection. Moreover, although illustration is omitted, since it is the same as that of the 1st operation gestalt also about arrangement between shafts, an engagement graph, and a velocity diagram, it has explanation of the 1st operation gestalt of the point which refers to them, and replaces with a symbol description.
[0133] As for this operation gestalt, the configuration of a high torque-transmission system is different from any previous gestalt. Moreover, a configuration which is different from a precedence implementation gestalt also about the configuration of the change gear case 10 and the configuration of the 2nd clutch (C-2) is taken. Hereafter, difference is mainly explained about the gear train of this operation gestalt.
[0134] With this gestalt, the back end of the change gear case 10 is set to covering 10E of another object with case body 10B, and support wall 10C is united with case body 10B. Therefore, the taper with which each component on the backside [C / support wall 10] spreads in 10f of peripheral walls of case body 10B in back contrary to each previous operation gestalt so that inclusion may be possible from a case back end

side is attached.
[0135] With this configuration, since the moderation planetary gear G1 which constitute a high torque-transmission system will be supported by covering 10E usually made into the product made from aluminum material, they are considered as the configuration fixed to the sleeve of iron system metal inserted in backside [covering 10E] boss section 10e through a sleeve at covering 10E by carrying out spline engagement immobilization of the sun gear S1 as a reaction force element. and the ring wheel R1 as an input element -- an input shaft 11 -- shaft orientations -- it is connected through flange 11b which carried out spline engagement movable. Moreover, connection support of the carrier C1 as an output element is carried out at the cylinder 60 common to the 1st and 3rd clutches.
[0136] The friction member 63 of the 1st clutch (C-1) is arranged at the periphery side of the moderation planetary gear G1. And the friction member 73 of the 3rd clutch (C-3) is arranged at the periphery side of the planetary-gear set G. Thus, making these frictions members 63 and 73 overlap an outer-diameter side to the moderation planetary gear G1 and the planetary-gear set G, respectively These friction members due to transmitting the torque which slowed down the engine torque and was amplified, and said urinal stall torque load It has the implications which avoid the increment in the shaft-orientations dimension by the increment in the friction member number of sheets accompanying minor-diameter-izing at the time of arranging from said clutch C-2 to shaft orientations to the moderation planetary gear G1 and the planetary-gear set G since it was a mass thing.
[0137] Thus, the hydraulic servo 6 and hydraulic servo 7 which operate the 1st clutch (C-1) and 3rd clutch (C-3) to the shaft-orientations other side of moderation planetary G1 are prepared to the friction member of both the arranged clutches (C-1, C-3). These hydraulic servos 6 and 7 make one inside and outside of a cylinder 60 carry out fitting of each pistons 61 and 71 of those, and are arranged possible [actuation] separately. Furthermore, a piston 61 is fitted in inside the cylinder 60 of the drum 62 which engages with the periphery side of the friction member 63 which constitutes a clutch (C-1) in detail, and one, and the piston 71 of the clutch C-3 which covers the outside of a cylinder 60 is united with the drum 72.
[0138] With the hydraulic-servo configuration of this array, a piston 61 pinches the friction member 63 of a clutch (C-1) between drums 62, and actuation which inputs moderation rotation of a carrier C1 into the sun gear S3 of a minor diameter through a hub 64 by that cause is performed. The servo force at this time constitutes the closed loop set off against the oil pressure reaction force applied to a cylinder 60 through the friction member 63 at return and a cylinder 60 from a piston 61. On the other hand, a piston 71 pinches the friction member 73 of a clutch (C-3) between the drums 62 of the 1st clutch, and performs actuation which inputs moderation rotation of a carrier C1 into the sun gear S2 of a major diameter through a hub 74 by that cause. The closed loop set off against the oil pressure reaction force which the servo force at this time also requires for a cylinder 60 through the friction member 72 at return and a cylinder 60 from a piston 71 is constituted.
[0139] Thus, by considering the location of the friction member of both clutches (C-1, C-3) as the arrangement which is separated from the outer edge of an automatic transmission, and arranging the hydraulic servos 6 and 7 for those actuation with a comparatively big design degree of freedom to an outer edge, a degree of freedom is given to the configuration of a change gear edge where interference with the car to carry poses a problem, and car loading nature is raised. And the cylinder of one clutch (C-1) is communalized, each piston 61 and 71 is put on inside-and-outside physical relationship, and the monopoly tooth space between both hydraulic servos is miniaturized, two clutches (C-1, C-3) holding, and enabling substitute actuation (such actuation being needed at the time of jump gear change) by making actuation possible separately.
[0140] On the other hand, since the clutch (C-2) in this gestalt is located in the front end section of a gear train, it can be considered as arrangement without an obstruction between that friction member and hydraulic servo. So, with this gestalt, the hydraulic servo 5 which operates a clutch (C-2) is made into the hydraulic servo of a quiescence cylinder mold which made the cylinder and the piston build in the change gear case 10. In detail, the cylinder 50 is formed in the oil pump cover which constitutes front end wall 10A of the change gear case 10 as a circular sulcus, and is considered as the configuration fitting of the shaft-orientations sliding of the same ring tabular piston 51 was made [configuration] free to the interior. And this piston 51 will be considered as the configuration which presses a pressure plate 58 through thrust bearing 57, will pinch the friction member 53 between the flanges 59 united with the input shaft 11, and will input the input rotation from the hub by the side of a flange 59 into carriers C2 and C3 through a drum 52.
[0141] By the way, although it becomes impossible to offset the unbalanced force of shaft orientations by carrying out the closed loop of the servo force within a servo drum like the hydraulic servo united with the

common drum when such a quiescence cylinder type of hydraulic-servo configuration is taken With this gestalt, the sun gear S1 as the reaction force element is fixed to the change gear case 10 in the moderation planetary gear G1. By the configuration in which the ring wheel R1 as the input element is connected with the input shaft 11 through flange 11b, and bearing 15 was arranged between flange 11b and a sun gear S1 The servo force of the quiescence cylinder mold hydraulic servo 5 is transmitted to a sun gear S1 through an input shaft 11, flange 11b, and bearing 15, and is made to be supported by covering 10E of the change gear case 10.

[0142] Next, drawing 21 - drawing 23 show the 5th operation gestalt and its modification. These gestalten are mentioned as an example of application to the thing of a configuration of not setting a moderation shaft as the counter shaft Y in the automatic transmission which takes the gestalt of transformer RUAKUSURU, although it is not what added the alteration to the high torque-transmission system concerning the basic feature of this invention itself.

[0143] As a skeleton shows, in order to use a gear train configuration as the mere idler gear 23 with which the gearing on the counter shaft Y doubles the hand of cut of the counter drive gear 19, and the hand of cut of the differential-gear ring wheel 31 with this gestalt at drawing 21 , the counter drive gear 19 as an output member on a main shaft X is arranged at the foremost part of a change gear style according to the location of the differential-gear ring wheel 31. Each element arrangement of that complementary in this case is the same as that of the 3rd modification of the 1st operation gestalt shown in drawing 10 almost. However, with the inversion of arrangement of the counter drive gear 19 and the 2nd clutch (C-2), as shown in drawing 22 , the ring wheel R2 and the counter drive gear 19 of the planetary-gear set G are connected by the power transfer member of the shape of a drum which covers the periphery of the 2nd clutch (C-2).

[0144] Although the advantage by this operation gestalt is similar with the case of said 3rd modification which takes the almost same arrangement Since the counter drive gear 19 will be especially supported by case front end wall 10A as a description of this gestalt, It is not necessary to prepare a support in case body 10B, and compares with the 1st modification shown in drawing 8 which moreover takes the supporting structure to a case similarly. In order to mean putting the counter drive gear 19 which produces a gear noise on the innermost part of the change gear by which noise radiation cannot be carried out easily, it becomes advantageous in respect of reduction of a gear noise.

[0145] Next, the train configuration shown in the cross section [-izing / drawing 23 / the cross section / the ** type] shows the 9th modification which made the configuration of a high torque-transmission system be the same as that of the case of the 4th operation gestalt in the 5th operation gestalt. In this case, since the friction member 73 of the 3rd clutch (C-3) ******s to the periphery of the planetary-gear set G, the 2nd brake (B-2) and one-way clutch (F-1) were moved ahead relatively, and physical relationship and the sense have reversed them that the capacity of the hydraulic servo of the 2nd brake (B-2) should be secured from relation with the outer diameter of the planetary-gear set G which was described previously.

[0146] The advantage of this gestalt becomes what doubled the advantage of the high torque-transmission system of the 4th operation gestalt, and the advantage of the above-mentioned 5th operation gestalt.

[0147] Although each above operation gestalt illustrates application to the transformer axle of this invention, this invention is applicable also to the vertical-type change gear for front engine Riyadh live (FR) vehicles. Drawing 24 - drawing 29 show the 6th operation gestalt and its modification as such instantiation. Essentially, the change gear style in these gestalten also has two differences accompanying having made said each gestalt vertical, although it was the same. Since constraint of axial length is loose compared with the case of a horizontal type, the 1st [the] is a gear change transient especially the one-way clutch which has the same semantics as the juxtaposition of an one-way clutch (F-1) to the 2nd brake (B-2) in a precedence implementation gestalt that it should hold and the oil pressure control at the time of substitute gear change should be simplified, and the point of having established the combination of a brake to the 1st brake (B-1). And the 2nd is a point which has connected the ring wheel R2 as an output element with the input shaft 11 and the output shaft of the same axle.

[0148] Since the name of the 2nd brake and an one-way clutch has shifted to each precedence gestalt with addition of such a component, redundancy is the semantics which avoids derangement although it becomes, and it explains anew from a gear train configuration.

[0149] Drawing 24 - drawing 27 show the gear train of the 6th operation gestalt by the skeleton. With reference to drawing 24 , the configuration by which the torque converter 4 with a lock-up clutch connected with the engine which is not illustrated at the foremost part of that device has been arranged, and the change gear style which attains advance 6 ** and the go-astern 1st speed at that posterior part has been arranged is taken with this automatic transmission. A torque converter 4 is equipped with the pump impeller 41, the

turbine runner 42, the stator 43 arranged among them, the one-way clutch 44 which makes the case section 10 of a change gear carry out one direction rotation engagement of the stator 43, and the stator shaft 45 which fixes the inner ball race of an one-way clutch to the case section 10 of a change gear.
[0150] The planetary-gear set G which forms the subject of a change gear style The sun gears S2 and S3 of a pair with which the diameters of size differ like each previous operation gestalt, While gearing mutually and one side's gearing to the sun gear S2 of a major diameter, it gears to a ring wheel R3, and it consists of RABINIYO-type gear sets by which another side consists of a carrier C2 (C3) which supports the pinion gears P2 and P3 of a pair which gear to the sun gear S3 of a minor diameter.
[0151] Moreover, it is similarly constituted from simple planetary gear by the moderation planetary gear G1. While the ring wheel R1 as the input element is connected with an input shaft 11 and the carrier C1 as an output element is connected with the minor diameter sun gear S3 through the 1st clutch (C-1) It connects with the sun gear S2 of a major diameter through the 3rd clutch (C-3), and the sun gear S1 as a fixed element which takes reaction force is fixed to the change gear case 10.
[0152] The relation between engagement and release of each clutch in the case of this automatic transmission, a brake, and an one-way clutch, and the gear ratio attained comes to be shown in the engagement graph of drawing 25 . In O mark in an engagement table, engagement and the-less mark express the engagement to which release and ** mark do not carry out the direct action of the engagement only at the time of engine brake, and the - mark to achievement of a gear ratio. Moreover, drawing 26 shows the relation between the gear ratio attained by engagement (those engagement is expressed with - mark) of each clutch and a brake, and the rotational frequency ratio of each gear change element at that time with a velocity diagram.
[0153] The 1st ** (1st) is engagement (in this gestalt, although it replaces with engagement of this brake (B-3) and automatic engagement of an one-way clutch (F-2) is used so that it may understand with reference to an actuation table) of a clutch (C-1) and a brake (B-3) so that both drawings may be combined and referred to and may be known. it is as being only those names and having explained why the reason for using this engagement and this engagement are equivalent to engagement of a brake (B-3) in the previous operation gestalt with the relation between a brake (B-2) and an one-way clutch (F-1). It is attained. In this case, reaction force is taken on the carrier C3 with which the rotation slowed down through the moderation planetary gear G1 from the input shaft 11 was inputted into the minor diameter sun gear S3 by the C-clutch 1 course, and was stopped by engagement of an one-way clutch F-2, and moderation rotation of the maximum reduction gear ratio of a ring wheel R3 is outputted to output-shaft 19A.
[0154] Next, the 2nd ** (2nd) is attained by engagement (why these engagement is equivalent to engagement of a brake (B-1) is explained in full detail behind.) of the brake (B-2) which confirms engagement and it of a clutch (C-1) and the one-way clutch (F-1) equivalent to engagement of a brake (B-1). In this case, reaction force is taken to the major-diameter sun gear S2 with which the rotation slowed down through the moderation planetary gear G1 from the input shaft 11 was inputted into the minor diameter sun gear S3 via the clutch (C-1), and was stopped by engagement of a brake (B-2) and an one-way clutch (F-1), and moderation rotation of a ring wheel R3 is outputted to output-shaft 19A. The reduction gear ratio at this time becomes smaller than the 1st ** (1st) so that it may see to drawing 26 .
[0155] Moreover, the 3rd ** (3rd) is attained by coincidence engagement of a clutch (C-1) and a clutch (C-3). In this case, the rotation slowed down through the moderation planetary gear G1 from the input shaft 11 is inputted into the major-diameter sun gear S2 and the minor diameter sun gear S3 via a clutch (C-1) and a clutch (C-3) at coincidence. Since the planetary-gear set G will be in a direct connection condition, rotation of the same ring wheel R3 as the input rotation to both sun gears is outputted to output-shaft 19A as rotation slowed down to rotation of an input shaft 11.
[0156] Furthermore, the 4th ** (4th) is attained by coincidence engagement of a clutch (C-1) and a clutch (C-2). In this case, the rotation slowed down through the moderation planetary gear G1 from the input shaft 11 by one side is inputted into a sun gear S3 via a clutch (C-1). The non-slowing down rotation inputted via the clutch (C-2) from the input shaft 11 on the other hand is inputted into a carrier C3, and middle rotation of two input rotations is outputted to output-shaft 19A as rotation of the ring wheel R3 slightly slowed down to rotation of an input shaft 11.
[0157] Next, the 5th ** (5th) is attained by coincidence engagement of a clutch (C-2) and a clutch (C-3). In this case, the rotation which the non-slowing down rotation as which the rotation slowed down through the moderation planetary gear G1 from the input shaft 11 by one side was inputted into the sun gear S2 via the clutch (C-3), and was inputted via the clutch (C-2) from the input shaft 11 on the other hand was inputted into the carrier C2, and accelerated it more slightly than rotation of the input shaft 11 of a ring wheel R3 is

outputted to output-shaft 19A.
[0158] And the 6th ** (6th) is attained by engagement of a clutch (C-2) and a brake (B-1). In this case, non-slowing down rotation is inputted only into a carrier C2 via CHIKURATCHI (C-2) from an input shaft 11, reaction force is taken to the sun gear S2 stopped by engagement of a brake (B-1), and the rotation which accelerated the ring wheel R3 further is outputted to output-shaft 19A.
[0159] In addition, go-astern (R) is attained by engagement of a clutch (C-3) and a brake (B-3). In this case, reaction force is taken on the carrier C2 with which the rotation slowed down through the moderation planetary gear G1 from the input shaft 11 was inputted into the sun gear S2 via the clutch (C-3), and was stopped by engagement of a brake (B-3), and the inversion of a ring wheel R3 is outputted to output-shaft 19A.
[0160] Here, the relation of the one-way clutch (F-1) and both the brakes (B-1, B-2) which touched previously is explained. In this case, an one-way clutch (F-1) can be made to demonstrate a function equivalent to engagement of a parenchyma top brake (B-1) by considering as a setup which doubled the engagement direction of the one-way clutch (F-1) connected with the sun gear S2 in the reaction force torque support direction at the time of the 2nd ** of a sun gear S2. However, since unlike a carrier C2 (C3) this sun gear S2 is not only engaged in order to acquire the engine brake effectiveness at the time of the 2nd **, but is a gear change element stopped also for the 6th ******, a brake (B-1) is needed. Moreover, although a sun gear S2 rotates to hard flow to an input hand of cut at the time of the 1st ** (1st) achievement so that it may understand also with the velocity diagram of drawing 24 , in the case of the gear ratio of the 3rd more than **, it rotates in the same direction as an input hand of cut. Therefore, since an one-way clutch (F-1) cannot be connected with a direct holddown member, it is considering effectiveness of an engagement condition as the controllable configuration by serial arrangement with a brake (B-2).
[0161] Thus, each gear ratio attained serves as a good rate step at equal intervals comparatively to each gear ratio so that it may understand qualitatively on the velocity diagram of drawing 26 with reference to spacing of the vertical direction of O mark which shows the velocity ratio of ring wheels R3 and R2. If a numeric value is set up and this relation is expressed quantitatively concretely, it will become a step between the gear ratio shown in drawing 25 . The gear ratio in this case is the case where it is set as gear ratio lambda3=0.375 of the sun gear S1 of the moderation planetary gear G1, the sun gear S2 by the side of gear ratio lambda1=0.556 of a ring wheel R1, and the major-diameter sun gear of the planetary-gear set G, the sun gear S3 by the side of gear ratio lambda2=0.458 of a ring wheel R2 (R3), and a minor diameter sun gear, and a ring wheel R3, and gear ratio width of face is set to 6.049.
[0162] Next, drawing 27 shows the configuration of an automatic transmission further to a detail in a cross section. Although the same reference mark is attached and being replaced with explanation about each component previously explained with reference to the skeleton, the details which cannot be referred to from a skeleton are explained below. First, with this gestalt, although the input shaft 11 is divided into section 11B in axial first portion 11A and the second half of a shaft mainly for the facilities on processing, it is considered as the configuration which was made to carry out fitting closely and was made to unify on parenchyma by a spline etc. mutually. The front end section by which the input shaft 11 was minor-diameter-ized is connected with the turbine runner 42 of a torque converter 4, and is supported by before [front end wall 10A by which the front end section of a major diameter is constituted from an oil pump cover of the change gear case 10 through the stator shaft 45] side boss section 10a free [rotation]. The back end section by which the input shaft 11 was minor-diameter-ized is fitted in crevice 19a of output-shaft 19A, and is supported by back end wall 10e of the change gear case 10 free [rotation] through output-shaft 19A. The input section to the moderation planetary gear G1 is used as the flange of input-shaft first portion 11A, and is connected with the ring wheel R1.
[0163] Supply way 11p of the line pressure connected with the oilway within a case formed in before side boss section 10a and supply way 11r of lubricous ** are formed in this input-shaft first portion 11A, it closes and the shaft-orientations edge of supply way 11p is open for free passage to the hydraulic servo of the 1st clutch with the direction oilway of a path. Moreover, the shaft-orientations edge of supply way 11r of lubricous ** is opened wide, and is open for free passage on 11s of supply ways of the lubrication oil pressure formed in section 11B in the second half of an input shaft. Termination of the 11s of the supply ways of the lubrication oil pressure of section 11B is carried out near the back end section of a shaft, and they are separated in the second half of an input shaft with 11t of supply ways of the line pressure formed in the back end side of a shaft.
[0164] Next, output-shaft 19A is supported by back end wall 10e of the change gear case 10 free [rotation] through a roller bearing in the front end section, and the backmost part of the change gear case 10 supports

the back end section free [rotation] through ball BEARIGU. The connection section to the output element of the planetary-gear set G is used as the flange of section 11B in the second half of an input shaft, and is connected with the ring wheel R3 through the drum-like member.
[0165] The supply way of the line pressure which leads to the oilway within a case of the posterior part of the change gear case 10 is formed in this output-shaft 19A of said crevice 19a, and this supply way is open for free passage to the hydraulic servo 5 of the 2nd clutch (C-2) through 11t of supply ways formed in the back end section of section 11B in the second half of an input shaft in which it was fitted in crevice 19a.
[0166] the planetary-gear set G -- ****** of second half section of input shaft 11B -- it is arranged mostly at the periphery side of a central part, and a sun gear S3 is supported by the periphery of second half section of input shaft 11B free [rotation], and is further supported free [rotation of a sun gear S2] at the periphery. The carriers C2 and C3 which support pinions P2 and P3 are unified, the front end section is supported by the sun gear S2 free [rotation], and the back end section is supported by second half section of input shaft 11B free [rotation].
[0167] the moderation planetary gear G1 -- ****** of the major diameter of input-shaft first portion 11A -- it is arranged mostly on a periphery at a mid gear, and the sun gear S1 is being fixed to the back end of the stator shaft 45 fitted in before [the change gear case 10] side boss section 10a inner circumference by spline fitting. Support-at-one-end support of the carrier C1 of the moderation planetary gear G1 is carried out at the periphery of before side boss section 10a.
[0168] The 1st clutch (C-1) is supported by the periphery of input-shaft first portion 11A free [rotation] in the inner circumference section of the cylinder 60, and is connected with the carrier C1 of the moderation planetary gear G1 through the hub 74 of the 3rd clutch (C-3). Engagement support of the friction member 63 which consists of the friction material and separator plate of many plates of a clutch (C-1) is carried out in a separator plate at the inner circumference of a drum 62, engagement support of the inner circumference of friction material is carried out at the periphery of a hub 64, it is arranged between a drum 62 and a hub 64, and the inner circumference of a hub 64 is connected with the sun gear S3. The hydraulic servo 6 of a clutch (C-1) uses the inside of a drum 62 as a cylinder 60, and is considered as the configuration equipped with the return spring arranged between the piston 61 fitted in it free [shaft-orientations sliding], the cancellation plate by which the shaft-orientations stop was carried out to the inner circumference section of a drum 62, and a piston 61 and a cancellation plate.
[0169] While the drum 72 is connected with the inner ball race of an one-way clutch (F-1), the front end section is supported by before [the change gear case 10] side boss section 10a free [rotation], and connection support of the 3rd clutch (C-3) is carried out in the back end section at the sun gear S2. Engagement support of the friction member 73 which consists of the friction material and separator plate of many plates of a clutch (C-3) is carried out in a separator plate at the inner circumference of a drum 72, engagement support of the inner circumference of friction material is carried out at the periphery of a hub 74, it is arranged between a drum 72 and a hub 74, and the back end of a hub 74 is being fixed to the drum 62 of the 1st clutch (C-1). The hydraulic servo 7 of a clutch (C-3) is considered as the configuration equipped with the return spring arranged between a drum 72, the cylinder 70 of one, the piston 71 fitted in it free [shaft-orientations sliding], the cancellation plate by which the shaft-orientations stop was carried out to the inner circumference section of a cylinder 70, and a piston 71 and a cancellation plate.
[0170] The back end section of the drum 52 is fixed to the flange of section 10B in the second half of an input shaft, and the 2nd clutch (C-2) is supported by the cantilever condition. Engagement support of the separator plate is carried out at the inner circumference of a drum 52, engagement support of the inner circumference of friction material is carried out at the periphery of a hub 54, and the friction member 53 which consists of the friction material and separator plate of many plates of a clutch (C-2) is arranged between a drum 52 and a hub 54, and the front end of a hub 54 is fixed to the carrier C3 of the planetary-gear set G, and it is supported by the cantilever condition. The periphery of an input shaft 11 is united with a drum 52 as a part of cylinder 50, and the hydraulic servo 5 of a clutch C-2 is considered as the configuration equipped with the return spring arranged between the piston 51 fitted in it free [shaft-orientations sliding], the cancellation plate by which the shaft-orientations stop was carried out to section 11B in the second half of an input shaft, and a piston 51 and a cancellation plate.
[0171] Let the 1st brake (B-1) be a band brake equipped with the band 83 which engages with the periphery of the drum 72 of the 3rd clutch (C-3). In addition, illustration is omitted about the hydraulic servo of this brake.
[0172] The 2nd brake (B-3) is used as the multiple disc brake which uses the friction material and separator plate of many plates as the friction member 93, stop support of the separator plate is carried out at change

gear case inner circumference, and engagement support of it is carried out in the hub 94 where friction material was fixed to the carrier C2. The hydraulic servo 9 of a brake (B-3) uses back end wall 10e of change gear case body 10B as a cylinder, and is considered as the configuration equipped with the piston 91 fitted in it free [sliding], and the return spring which a shaft-orientations stop is carried out to the back end wall of a change gear case, and contacts a piston 91. The extension which is extended along with 10f of peripheral walls of the case of a piston 91, and results in the back end of the friction member 93 carries out fitting of the periphery to spline of 10f of case peripheral walls 10g, and the baffle is carried out.

[0173] The polymerization of the friction member 93 of this brake (B-3) is made to carry out in the direction of a path to the periphery side of the sun gear S3 of the minor diameter of the planetary-gear set G, and it is arranged.

[0174] Moreover, the inner ball race is fixed to the cylinder 70 of the 3rd clutch (C-3), and an one-way clutch (F-1) is considered as the configuration united with the hub of a brake (B-2) in an outer race, and is arranged in the front of the 3rd clutch (C-3), i.e., the foremost part of a change gear style. Let the brake (B-2) which stops an outer race in the change gear case 10 be the brake of the multi-plate configuration which uses as a friction member the separator plate by which engagement support was carried out at the outer race at the friction material by which engagement support was carried out, and the inner circumference spline of a change gear case. The hydraulic servo of a brake (B-2) uses front end wall 10A of the change gear case 10 as a cylinder, and is considered as the configuration equipped with the piston fitted in it free [sliding], and the return spring which a shaft-orientations stop is carried out to the front end wall of the change gear case 10, and contacts a piston.

[0175] And carry out spline association of the inner ball race at the front end section of a carrier C2, and an one-way clutch (F-2) makes an outer race engage with spline 10g of change gear case inner circumference, and is arranged in the shaft-orientations location between the friction member 63 of the 1st clutch (C-1), and the planetary-gear set G.

[0176] The clutch (C-2) with which the direct input of the rotation of an input shaft 11 is carried out to a carrier C2 (C3) also in this 6th operation gestalt is a clutch which is not engaged at the time of the advance 1st speed (1st) - the 3rd speed (3rd), and go-astern (R) so that clearly from the aforementioned explanation. Therefore, this clutch (C-2) does not pay the magnification torque by moderation so that the urinal stall torque which amplified the engine torque from a torque converter 4 like [at the time of a car halt] may not be received and it may understand with reference to the velocity diagram of drawing 26 by contrast with other two clutches (C-1, C-3). Therefore, this clutch (C-2) can be used as a clutch with a small torque capacity (this capacity is decided by the number of sheets of the friction material of the diameter of a clutch, and a friction member) as compared with other clutches. Therefore, by making this diameter of a clutch small, the outer diameter of an automatic gear change posterior part can be made small, and effect on a vehicle indoor tooth space can be made small.

[0177] Output-shaft 19A has crevice 19a which counters the edge of an input shaft 11 formed, and is supported by the posterior part of an automatic transmission. Moreover, an input shaft 11 The point which counters the front end section of output-shaft 19A is fitted in crevice 19a of an output shaft, and the back end section is supported there. The supply way of the oil pressure to the hydraulic servo 5 of the 2nd clutch C-2 It is formed over the back end section of an input shaft 11 from output-shaft 19A. 10s of oilways for automatic gear change inside-of-a-plane section lubrication Since it is ahead formed from the back end section in which 11t of supply ways in an input shaft 11 was formed It compares, when putting side by side two oilways for the oil pressure for clutch actuation, and lubricating oil supply in the input-shaft back end section. Only the part can make small the path of the input-shaft 11 back-end section inserted in crevice 19a of output-shaft 19A, and the path of the input-shaft posterior part fitted in crevice 19a of output-shaft 19A for support of the back end section of an input shaft 11 can be made small. Therefore, according to this configuration, the outer diameter of the posterior part in an automatic transmission can be made small also from the field of a shaft diameter, and effect on a vehicle indoor tooth space can be further made small.

[0178] As for the planetary-gear set G, the carriers C2 and C3 are constituted by one. Furthermore, carriers C2 and C3 Since the other end is held through a sun gear S2 at the direct-input shaft 11 and it is mostly supported by the input shaft 11 in the both-ends location, the end of the shaft orientations Since the planetary-gear set G which cannot avoid easily that mass becomes large because there are many gear change elements can be mostly supported in a both-ends location to the input shaft 11 which is the same member, the concentricity of support becomes high and the accurate planetary-gear set arrangement of it is attained.

[0179] Next, since the part which serves as original dead space by the side of a planetary-gear set G periphery since the friction member 93 of the 2nd brake (B-3) is arranged at the periphery side lacking in the

ring wheel of the planetary-gear set G is utilizable effective in arrangement of the friction member 93 of a brake, it can use for compaction of the shaft orientations of a change gear, and the direction of a path.
[0180] Furthermore, since the friction member 93 is used as the friction member of many plates and the hydraulic servo 9 is arranged at the backmost part of a change gear, the 2nd brake (B-3) can use the back end wall of the automatic-transmission case 10 as an oil pressure servo cylinder, and ******ing of it to the change gear case exterior like [in case a hydraulic servo is a band brake] is lost, and it does not make the tooth space of a vehicle room small. Moreover, in the case of a band brake, the force to a certain direction is applied by the engagement to the carrier with which a band brake is arranged, and this has a bad influence on centering and support of a planetary-gear set or support of the input shaft with which the planetary-gear set is supported, or centering. Therefore, it is necessary to enlarge the bush, the bearing, or the input shaft itself for supporting an input shaft and a planetary-gear set. However, in this operation gestalt, since the 2nd brake (B-3) is a multiple disc brake, it does not have the following and can be used as a compact automatic transmission.
[0181] And the 3rd clutch (C-3) is arranged ahead of the moderation planetary gear G1. Before the cylinder 70 which forms the hydraulic servo 7 of the clutch is prolonged from change gear front end wall 10A, it is supported by side boss section 10a. The supply way of the oil pressure to the hydraulic servo 7 is formed in before side boss section 10a. The moderation planetary gear G1 Since it is considering as the structure which fixes the sun gear S1 to before side boss section 10a, connects a ring wheel R1 with an input shaft 11 behind the moderation planetary gear G1, and takes out the output from a carrier C1 ahead of moderation planetary G1 By using before side boss section for support [of the clutch drum 72], and supply of oil pressure 10a as a holddown member of the sun gear S1 of the moderation planetary gear G1, it becomes unnecessary to have prepared the support member for sun gear immobilization separately, and the part and miniaturization have accomplished.
[0182] Furthermore, since the stator shaft 45 was extended to the inner circumference of before side boss section 10a and the sun gear S1 of the moderation planetary gear G1 was fixed to the other end of a stator shaft at it, the miniaturization of the whole moderation planetary gear by minor-diameter-izing of a sun gear S1 is attained, and the shaft-orientations dimension of an automatic transmission is shortened by arranging the moderation planetary gear G1 by this miniaturization to the inner circumference side of the friction member 73 of the 3rd clutch (C-3).
[0183] Moreover, the moderation planetary gear G1 are arranged among the hydraulic servos 6 and 7 of the 1st clutch and the 3rd clutch. By the configuration the cylinder 70 which constitutes one side of these hydraulic servos was supported by the periphery of the before side boss section free [rotation], and the cylinder 60 which constitutes another side of a hydraulic servo was supported by whose periphery of an input shaft 11 free [rotation] Since only a part with the small path of a supporter can take the projected net area of a piston 61 greatly as compared with the case where a hydraulic servo is supported, on a before [the change gear case 10] side boss section 10a periphery, reservation of torque capacity is easy.
[0184] By the way, with said 6th operation gestalt, although the input shaft 11 was considered as the division configuration, if a structural advantage is searched for purely, an input shaft can also really be considered as a configuration. Drawing 28 shows the cross-section structure of the 10th modification which takes such a configuration. Hereafter, the semantics which avoids duplication explains only difference with said 6th operation gestalt in this gestalt. With this gestalt, the shaft-orientations physical relationship of the hydraulic servo 6 of the 1st clutch and the moderation planetary gear G1 is reversed to the 6th operation gestalt. In connection with this, it becomes possible to arrange the hydraulic servo 6 of the 1st clutch (C-1) as well as the hydraulic servo 7 of the 3rd clutch (C-3) on the periphery of before [a change gear case] side boss section 10a, and the hydraulic pressure supply to this servo as well as the 3rd clutch (C-3) is accomplished through an input shaft 11 from the oilway of before side boss section 10a. Furthermore, before [a change gear case] side boss section 10a becomes long, and the advantage of this configuration is also in the point that spacing of the supporter by the side of before an input shaft 11 and the supporter of the backside is shortened.
[0185] And in this 10th modification, the moderation planetary gear G1 are arranged at the inner circumference side of the friction member 63 of the 1st clutch. The hydraulic servo 6 of the 1st clutch is arranged ahead of moderation planetary gear. By the configuration by which the friction member 73 of the 3rd clutch has been arranged and the hydraulic servo 7 of the clutch of another side has been arranged ahead of the hydraulic servo 6 of one clutch at the periphery side A compact configuration is realizable with combination arrangement of the moderation planetary gear G1, the friction members 63 and 73 of both clutches, and hydraulic servos 6 and 7. Moreover, although pistons 61 and 71 cannot but have two or more

pars convoluta lobuli corticalis renis since the arrangement location of hydraulic servos 6 and 7 and the friction members 63 and 73 is offset consequently, the advantage whose rigidity of a piston improves is acquired.

[0186] And the moderation planetary gear G1 are arranged behind the hydraulic servos 6 and 7 of the 1st clutch and the 3rd clutch. Two cylinders 60 and 70 which constitute both hydraulic servos are supported by the periphery of before side boss section 10a free [rotation], and the supply way of the oil pressure to both the hydraulic servos 6 and 7 by the configuration formed in before side boss section 10a Since the supply way of the oil pressure to hydraulic servos 6 and 7 can be constituted without passing through an input shaft 11, formation of an oilway becomes easy. Moreover, since an input shaft 11 is 1 shaft, axial high rigidity is securable. Furthermore, since the planetary-gear set G is supported on the shaft which moreover narrowed supporter spacing such by spacing between the supporters of the input shaft 11 in a change gear case and output-shaft 19A becoming narrow since before [a change gear case] side boss section 10a had extended to the interior of an automatic transmission, support of a planetary-gear set becomes certain.

[0187] Moreover, it sets to the oilway for supplying a lubricating oil to the whole oilway or whole automatic transmission which supplies oil pressure to the hydraulic servo of a clutch in this 10th modification. About the number of seal rings arranged in order to prevent the leakage of the oil between the oilways of the member which carries out relative rotation, and the number of the oilway formed by lapping in a shaft The seal ring arranged in the oilway from the back end section of the change gear case 10 to the hydraulic servo of the 2nd clutch (C-2) as it understands, even if it sees drawing 28 2 sets and one the oilway which supplies oil pressure to the 1st and 3rd hydraulic servos from the oilway formed in before [the change gear case 10] side boss section 10a -- respectively -- every 1 set -- and 1-set (not shown) arrangement is carried out into the oilway which supplies oil pressure to the lubricating oil way formed in the input shaft 11 from the oilway formed in before [the change gear case 10] side boss section 10a. Therefore, a total of 5 sets and one seal ring will be arranged. Moreover, the number of the oilways within a shaft is one. Thus, with this operation gestalt, since the number of seal rings and the oilway within a shaft can be lessened, the effectiveness that there are few losses in power transfer and they can consider as an automatic transmission with a small shaft-orientations dimension is also acquired.

[0188] Finally, drawing 29 shows the 11th different modification in that support wall 10C was mainly prepared to the 6th operation gestalt. With this gestalt, the friction member of an one-way clutch (F-1) and the 2nd brake (B-2) is transferred to support wall 10C with the attachment of support wall 10C that the hydraulic servo of the 2nd brake (B-2) should be built in using this wall. And about the hydraulic servo 7 of the 3rd clutch (C-3), it considers as the arrangement which supports the cylinder 70 on the periphery of boss section 10c ahead extended from support wall 10C in order to make possible hydraulic pressure supply which does not mind an input shaft 11.

[0189] The advantage by this 11th modification is in the point that the drum 62 of the 1st clutch (C-1) which always rotates by the moderation rotation which passed through the moderation planetary gear G1 regardless of engaging and releasing of a clutch can be made to meet 10f side of peripheral walls of the change gear case 10. It becomes detectable by the sensor Sn which attached detection of an input rotational frequency required for change gear control in 10f of peripheral walls of the change gear case 10 by this, without making the sensor for it lay under the inner of a device.

[0190] as mentioned above, although this invention was explained in full detail also including the modification based on six operation gestalten, this invention can be variously looked like [each claim of a claim] within the limits of the matter of a publication, and can change and carry out the concrete configuration of details.

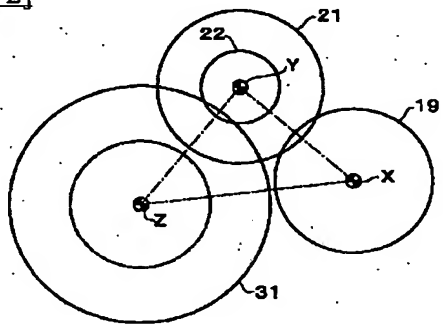
[Translation done.]

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DRAWINGS

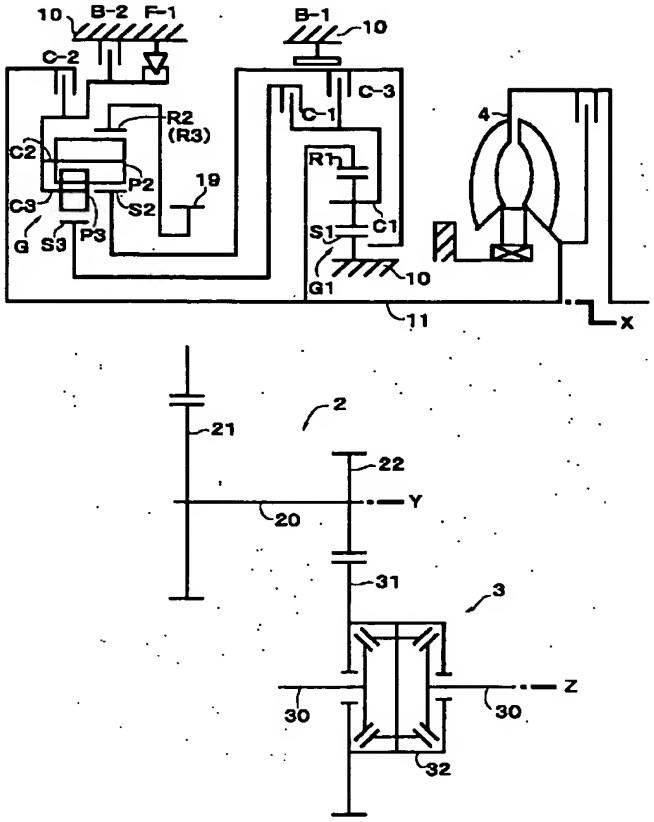
[Drawing 2]



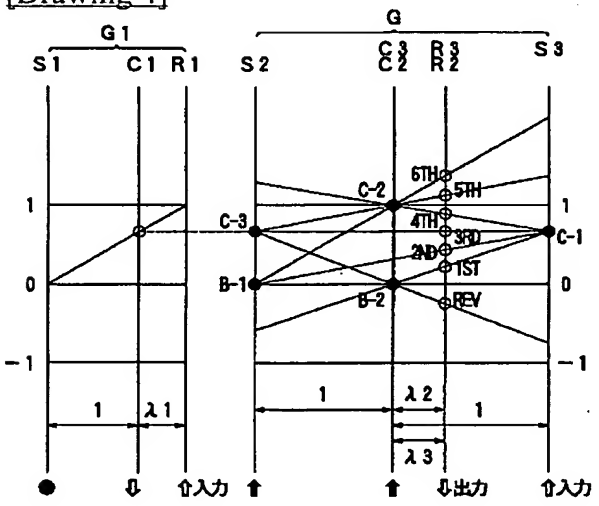
[Drawing 3]

	C-1	C-2	C-3	B-1	B-2	F-1	ギヤ比	ステップ
P								
REV			O		O		3.389	
N								
1ST	O				(O)	O	4.067	) 1.73
2ND	O			O			2.354	) 1.51
3RD	O		O				1.564	) 1.35
4TH	O	O					1.161	) 1.35
5TH		O	O				0.857	) 1.25
6TH		O		O			0.684	

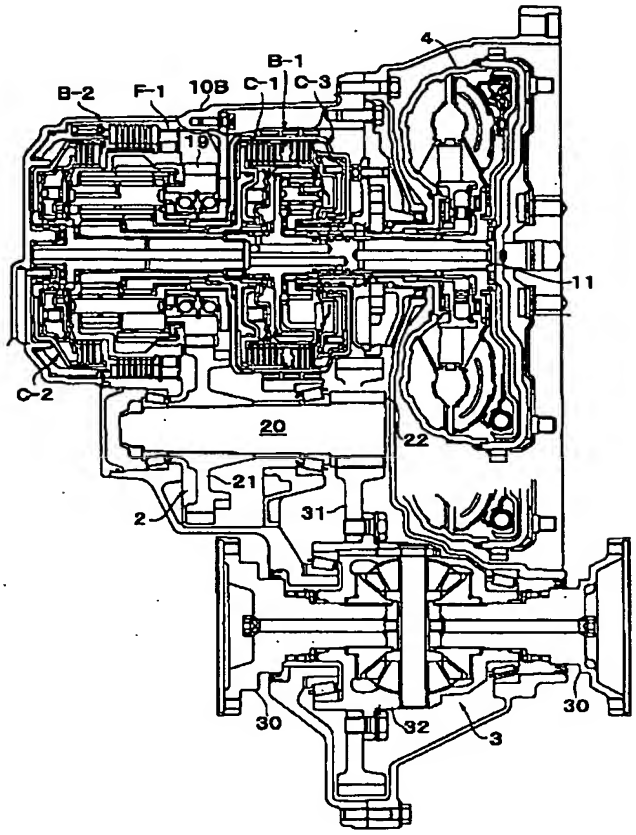
[Drawing 1]



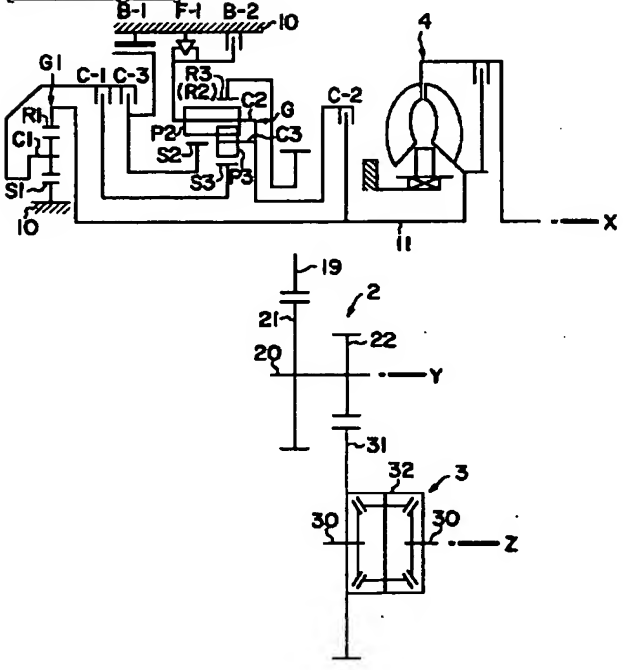
[Drawing 4]



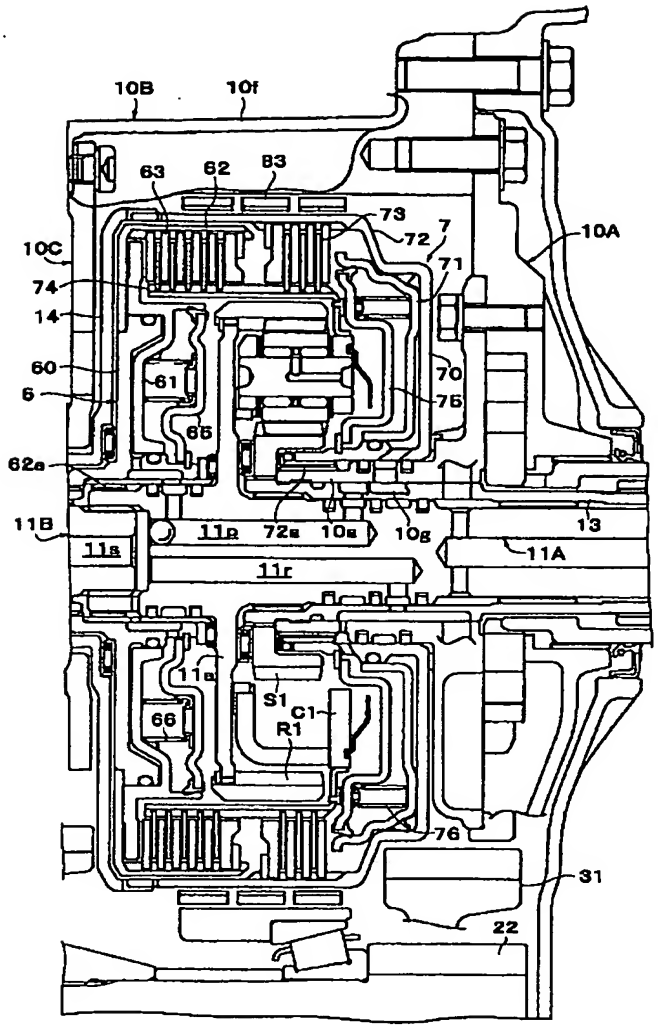
[Drawing 5]



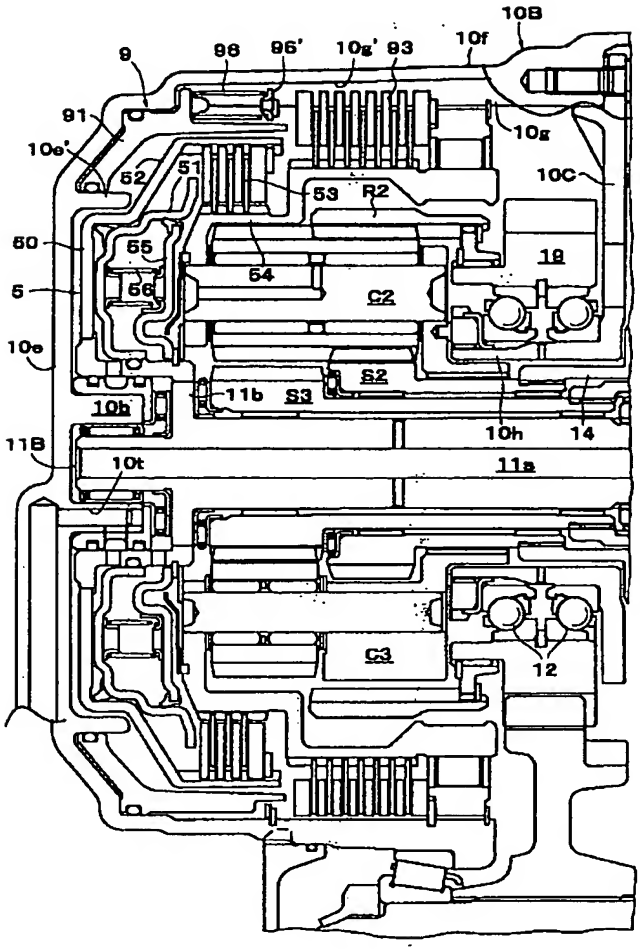
[Drawing 18]



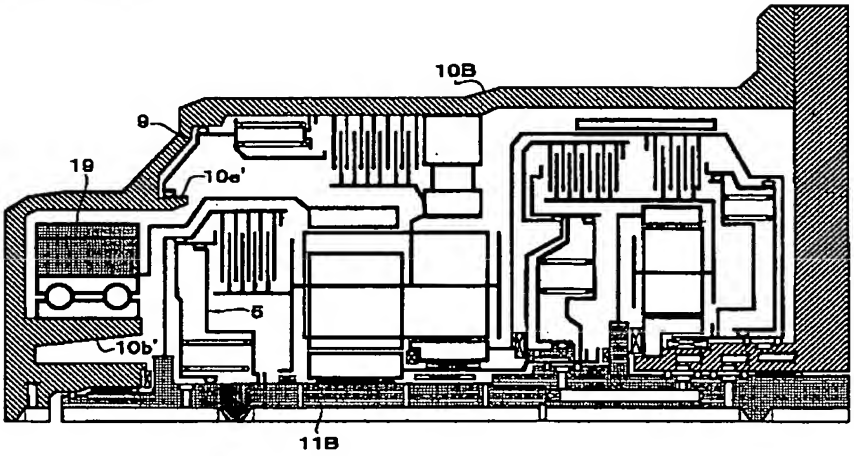
[Drawing 6]


10B
10f
63
62
B3
73
72
7
10A
10C
71
74
14
60
61
70
6
75
66
62a
11B
11a
11b
72a
10a
10g
13
11A
11r
11c
S1
C1
R1
66
76
31
22

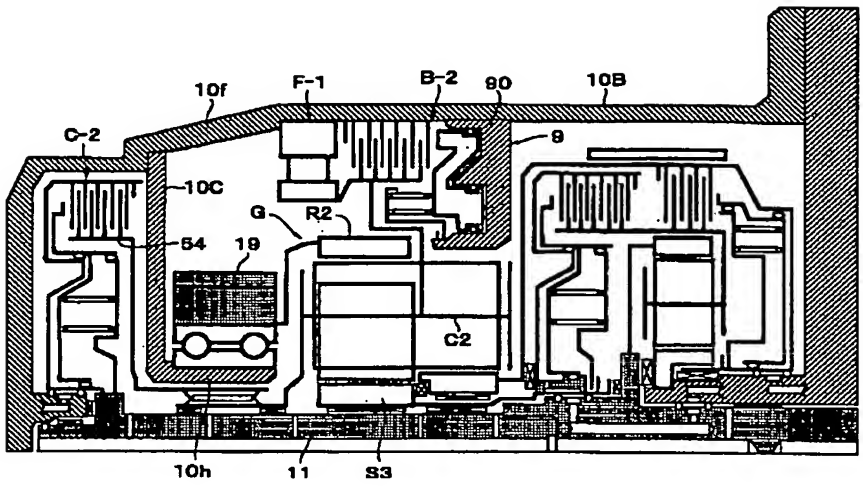
[Drawing 7]



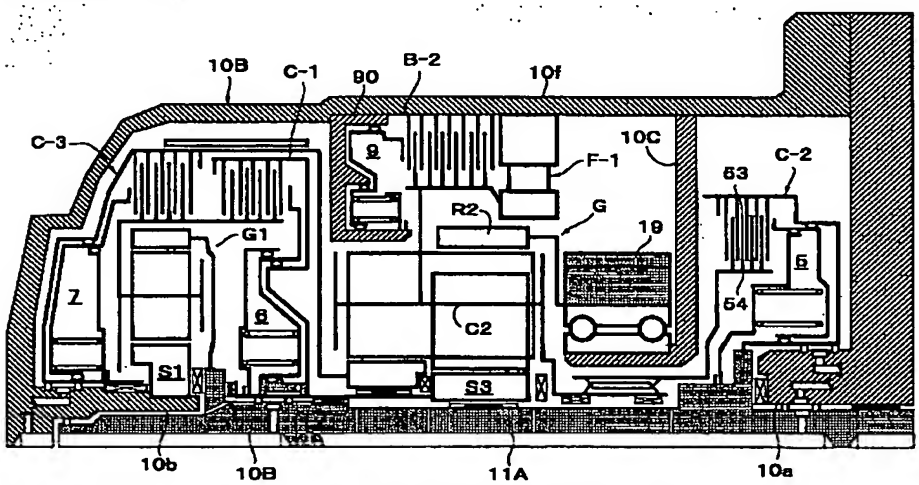
[Drawing 8]



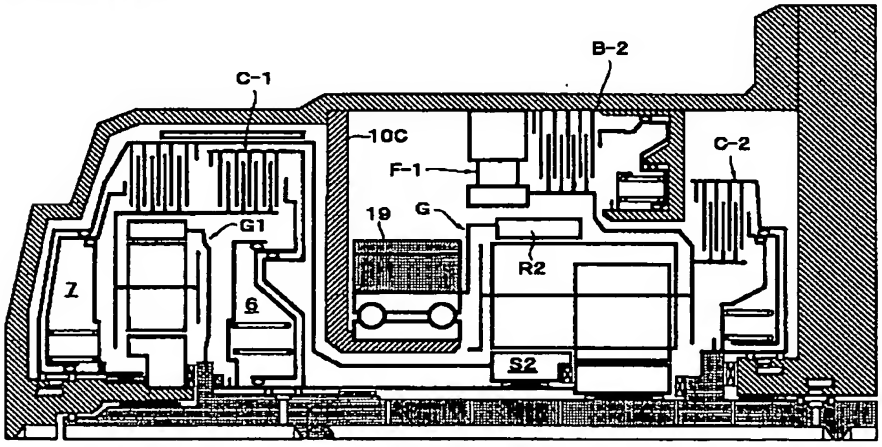
[Drawing 9]



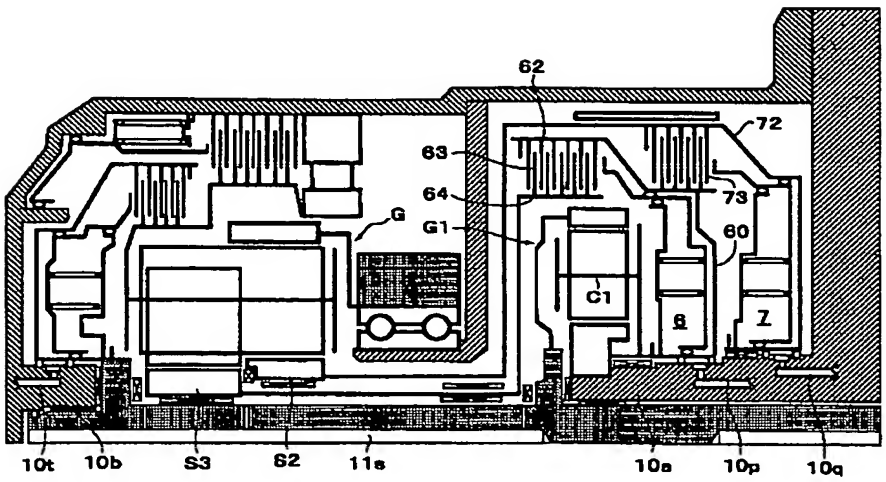
[Drawing 10]



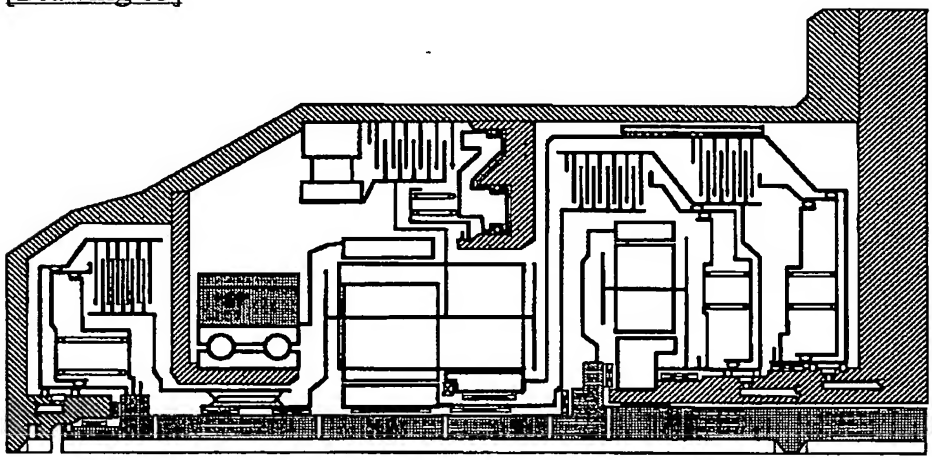
[Drawing 11]



[Drawing 12]



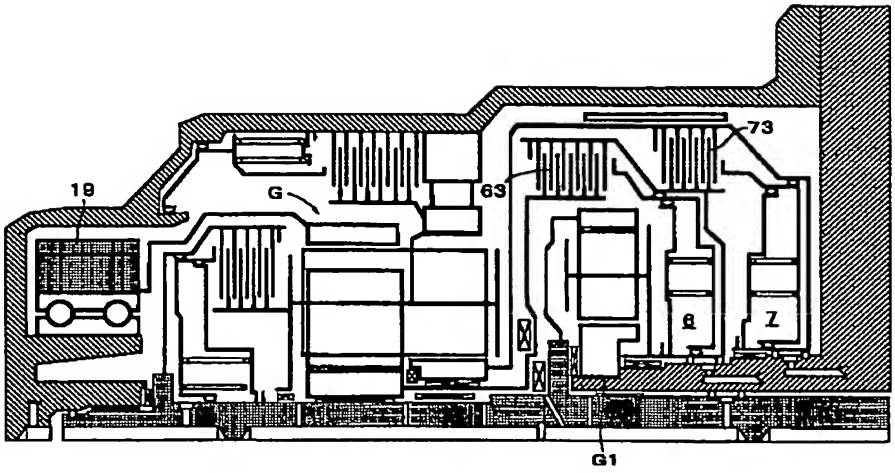
[Drawing 13]



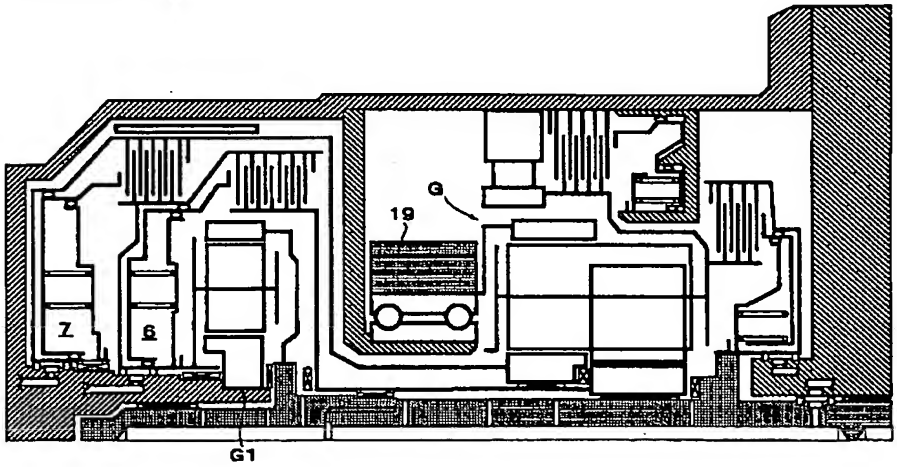
[Drawing 25]

	C－1	C－2	C－3	B－1	B－2	B－3	F－1	F－2	ギヤ比	ステップ
P										
R			○			○			3.394	
N										
1st	○					△		○	4.148	1.75
2nd	○			△	○		○		2.370	1.52
3rd	○		○		●				1.556	1.35
4th	○	○			●				1.155	1.34
5th		○	○		●				0.859	1.25
6th		○		○	●				0.686	

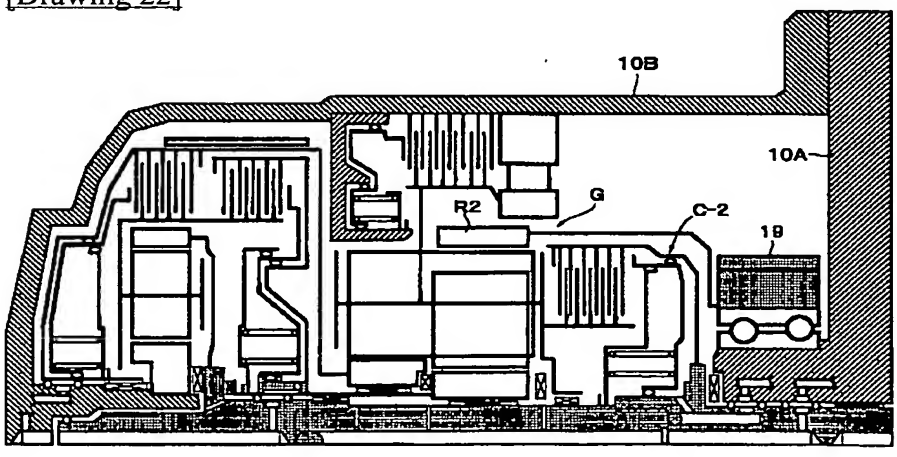
[Drawing 14]



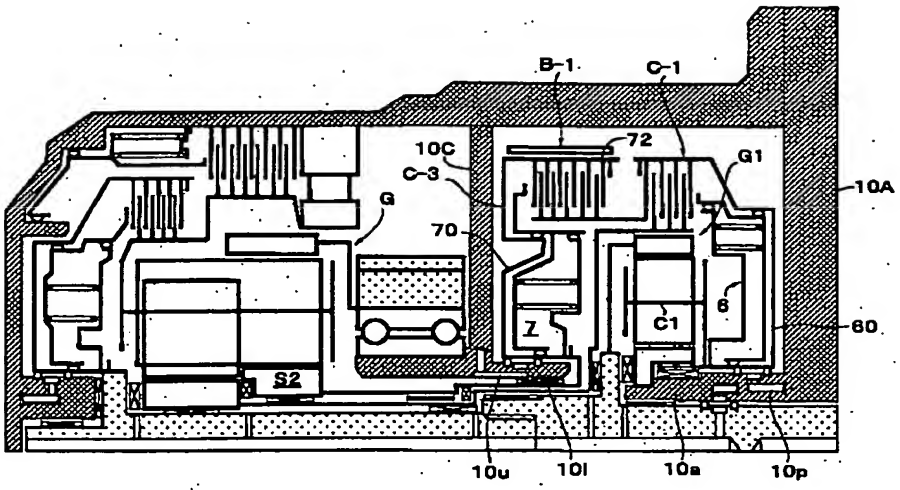
[Drawing 15]



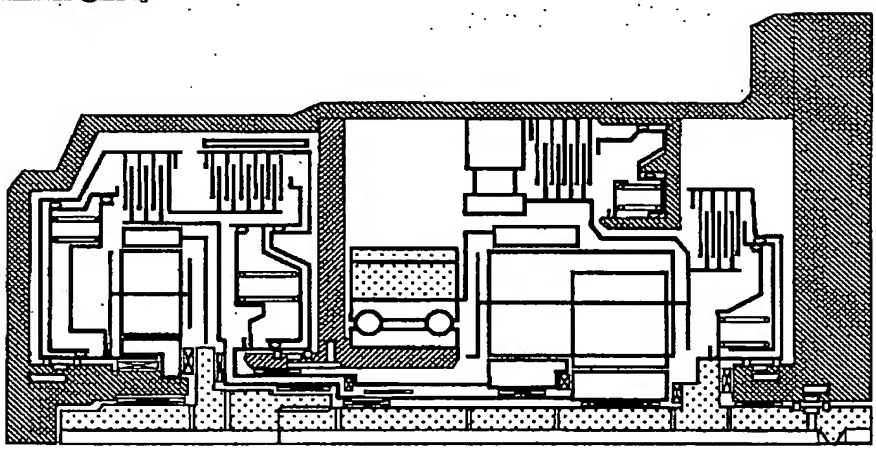
[Drawing 22]



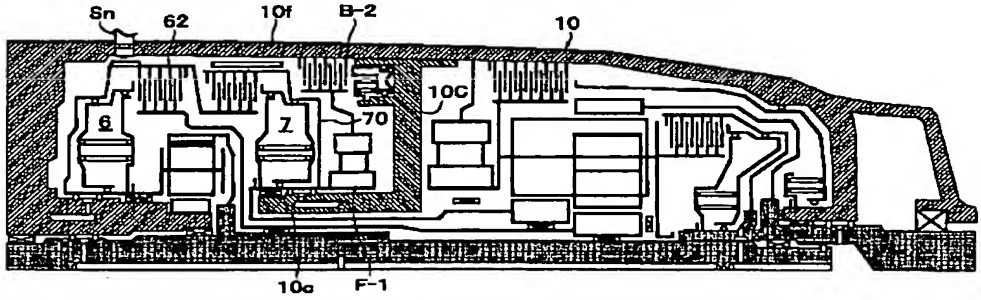
[Drawing 16]



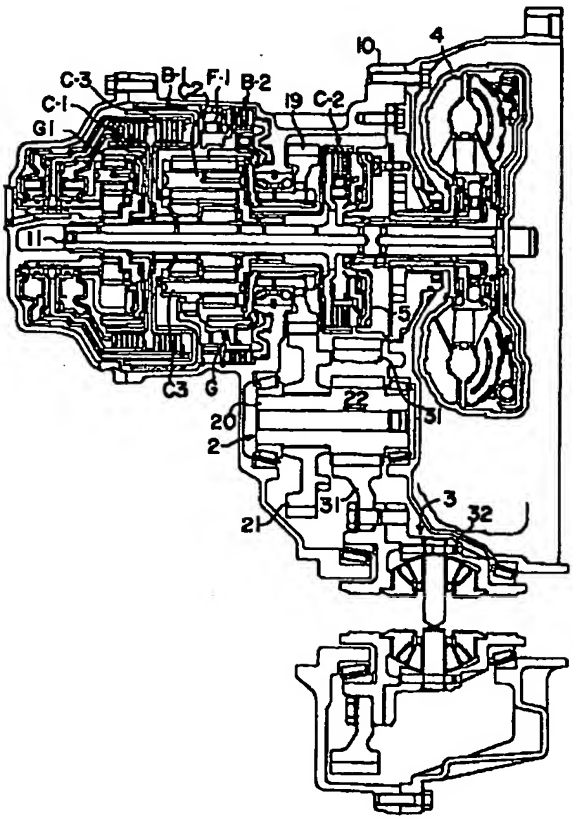
[Drawing 17]



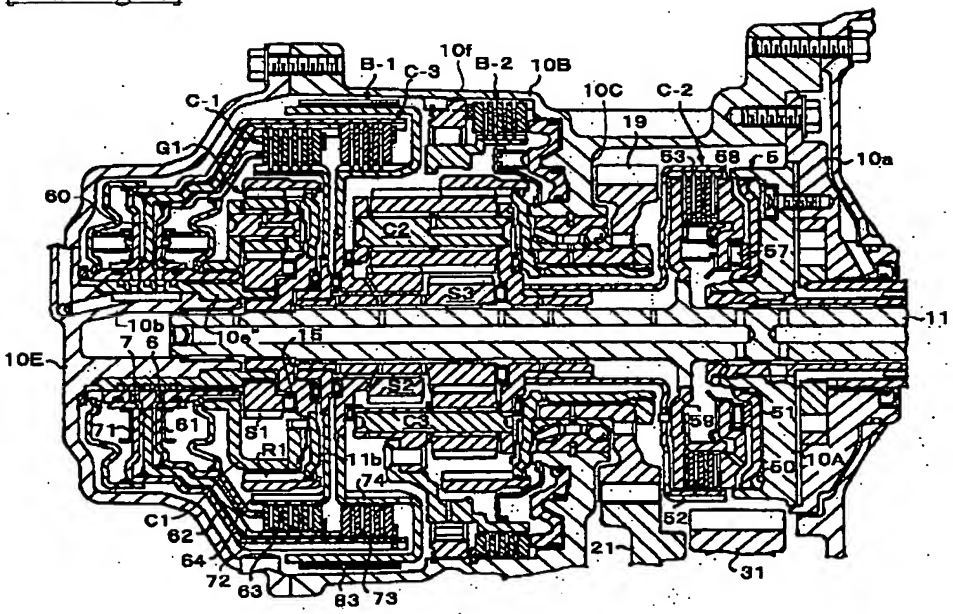
[Drawing 29]



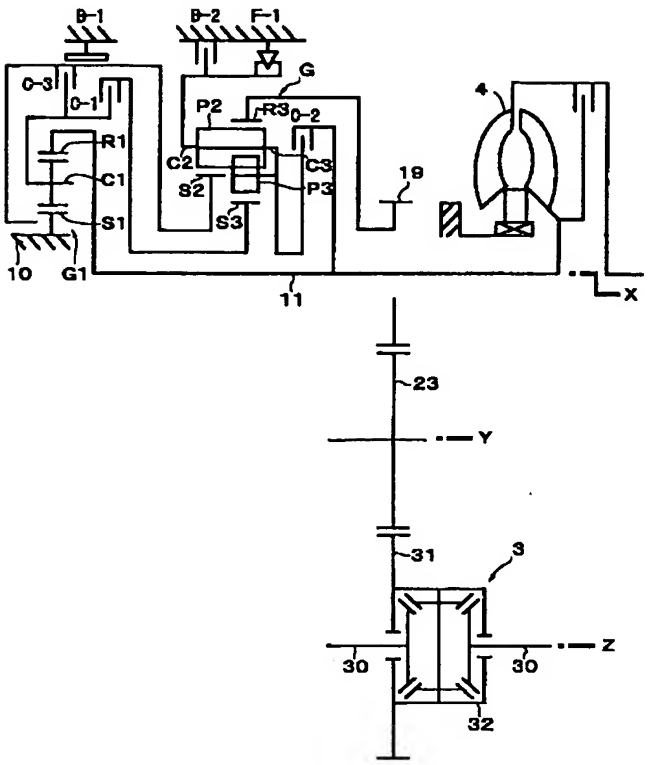
[Drawing 19]



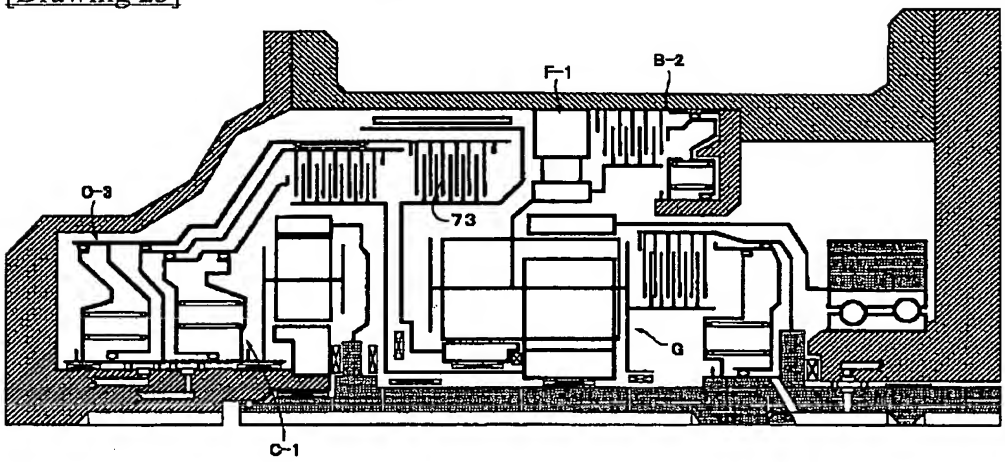
[Drawing 20]



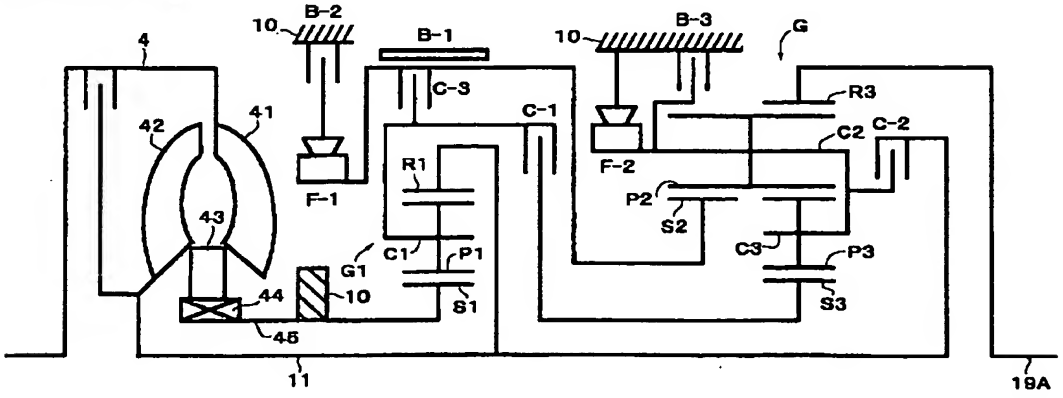
[Drawing 21]



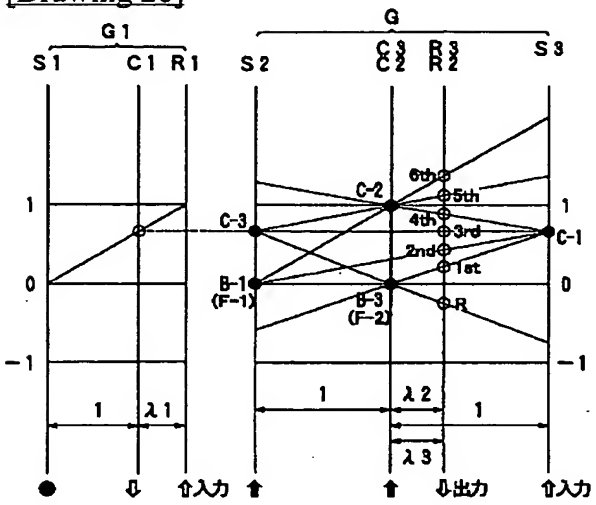
[Drawing 23]



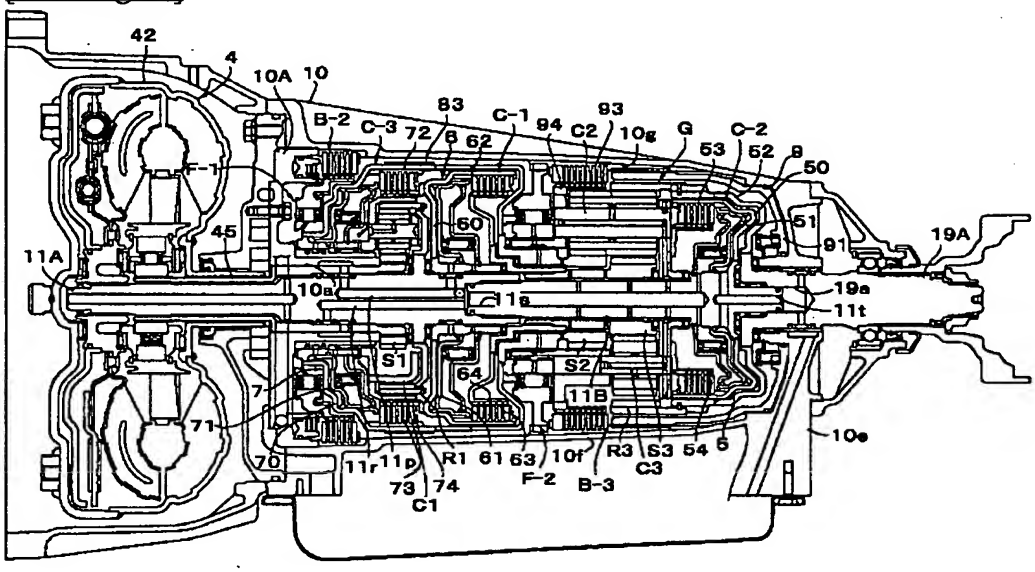
[Drawing 24]



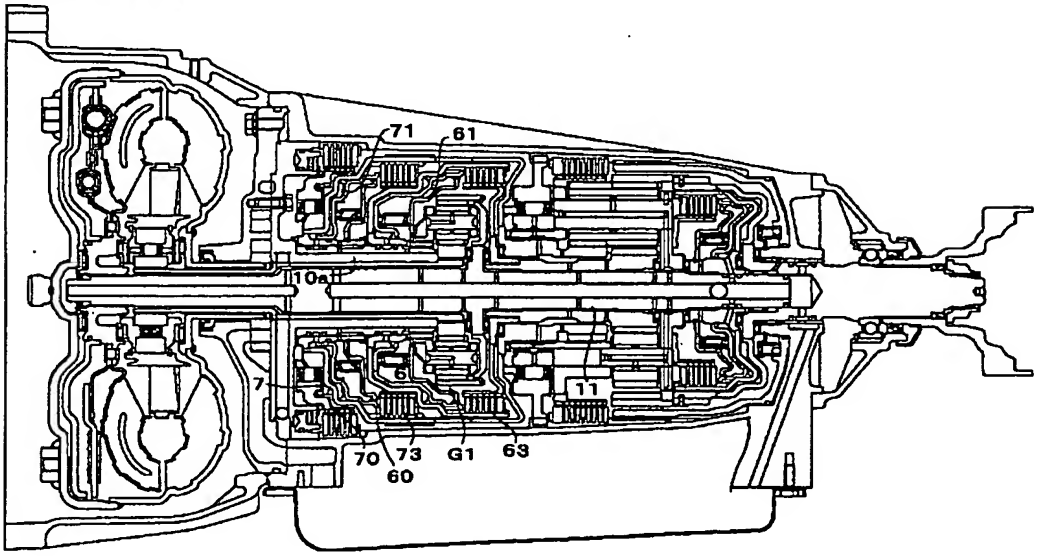
[Drawing 26]



[Drawing 27]



[Drawing 28]



[Translation done.]